DOCUMENT RESUME

ED 223 889 CE 034 464

TITLE	The Electronic and Computer Technician Vocational Education Incentive Grants Act. Hearing before the Subcommittee on Elementary, Secondary, and Vocational Education of the Committee on Education and Labor. House of Representatives, Ninety-Seventh Congress, Second Session (San Francisco, CA) on H.R. 5820.
INSTITUTION	Congress of the U.S., Washington, D.C. House Committee on Education and Labor.
PUB DATE	16 Apr 82
NOTE	80p.
PUB TYPE	Legal/Legislative/Regulatory Materials (090) -- Viewpoints (120)
EDRS PRICE	MF01/PC04 Plus Postage.
DESCRIPTORS	Computer Science; *Computer Science Education; Educational Legislation; *Electronics; Electronic Technicians; Federal Aid; *Federal Legislation; Hearings; *Incentive Grants; Postsecondary Education; *Program Development; Secondary Education; Technical Education; Vocational Education
IDENTIFIERS	Congress 97th; *Vocational Education Act 1963

ABSTRACT

This report documents a hearing to amend the Vocational Education Act of 1963 to make incentive grants to the states for electronic and computer technician vocational education programs. The discucssion focused on the Electronic and Computer Technician Education Incentive Grants Act. Testimony included prepared statements, letters, and supplemental material from 15 individuals representing high schools; Electronics Association of California; Apple Computer, Inc.; Director of Vocational Education, State of California; Atari; Electronics Industries Association; National Semiconductor; Contra Costa County Regional Occupation Program; Industry Education Council of California; and Association of Community Colleges Trustees. (YLB)

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THE ELECTRONIC AND COMPUTER TECHNICIAN VOCATIONAL EDUCATION INCENTIVE GRANTS ACT

HEARING

BEFORE THE

SUBCOMMITTEE ON ELEMENTARY, SECONDARY, AND VOCATIONAL EDUCATION

OF THE

COMMITTEE ON EDUCATION AND LABOR
HOUSE OF REPRESENTATIVES

NINETY-SEVENTH CONGRESS

SECOND SESSION

ON

H.R. 5820

TO AMEND THE VOCATIONAL EDUCATION ACT OF 1963 TO MAKE INCENTIVE GRANTS TO THE STATES FOR ELECTRONIC AND COMPUTER TECHNICIAN VOCATIONAL EDUCATION PROGRAMS

HEARING HELD IN SAN FRANCISCO, CALIF., ON
APRIL 16, 1982

Printed for the use of the Committee on Education and Labor

U.S. GOVERNMENT PRINTING OFFICE
94-231 O WASHINGTON : 1982

U.S. DEPARTMENT OF EDUCATION
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CONTENTS

Page

Hearing held in San Francisco, Calif., on April 16, 1982 1
Text of H.R. 5820 2

Statement of—

- Casey, John, principal, Pacific High School, San Leandro, Calif 58
- Conway, James, president, Electronics Association of California 28
- Eakin, David, science teacher, John Swett High School, Crockett, Calif 60
- Fisher, Glenn, computer specialist, Alameda County Superintendent of Schools Office 51
- Jobs, Steven P., chairman of the board, Apple Computer, Inc 15
- Langlin, Patricia, director of vocational education, State of California 9
- Mayer, Steven, vice president, research and product development, Atari 26
- Miller, Neil, special education teacher, Vacaville, Calif 61
- Petersen, Gary G., chairman, Electronic Industries Association, Human Resources Council, Manpower Task Force 29
- Picciotto, Armando, computer science teacher and district computer coordinator, Richmond Unified School District 55
- Preston, Robert, manager, technical training, National Semiconductor 43
- Priest, Charles, director, Contra Costa County Regional Occupation Program 46
- Weiss, Hank, executive vice president, Industry Education Council of California 39

Prepared statements, letters, supplemental material, etc.—

- Casey, John D., principal, Pacific High School, prepared statement of 59
- Eakin, David, science department chairman, John Swett High School, Crockett, Calif., prepared statement of 60
- Fisher, Glenn, computer specialist, Alameda County Superintendent of Schools Office, Hayward, Calif., prepared statement of 53
- Jobs, Steven P., chairman of the board, Apple Computer, Inc., prepared statement of 18
- Langlin, Patricia B., assistant superintendent of public instruction and director of vocational education, State of California, prepared statement of 11
- Meardy, William H., executive director, Association of Community College Trustees, Annandale, Va., letter to Chairman Perkins, dated April 16, 1982 74
- Miller, Neil, special education teacher, Vacaville, Calif.:
  - Prepared statement of 62
  - Sp.E.A.C.S. (needs assessment) 69
  - Speech Enrichment Assistance Computer System (SpEACS) (preliminary) 68
- Petersen, Gary G., chairman, Electronic Industries Association, summary submitted by 32
- Picciotto, Armando, computer science teacher and district computer coordinator, Richmond Unified School District, prepared statement of 56
- Preston, Robert, manager, technical training, National Semiconductor, Santa Clara, Calif., prepared statement of 45
- Priest, Charles A., director, regional occupational program, Pleasant Hill, Calif., prepared statement of 48
- Timothy, Paul M., manager, Industrial Relations, Guidance & Control Systems, Salt Lake City, Utah, letter to Chairman Perkins, dated March 31, 1982 75
- Weiss, Hank, executive vice president, Industry Education Council of California:
  - Moving computers into classrooms 43
  - Prepared statement of 41

THE ELECTRONIC AND COMPUTER TECHNICIAN VOCATIONAL EDUCATION INCENTIVE GRANTS ACT

FRIDAY, APRIL 16, 1982

House of Representatives,
Subcommittee on Elementary,
Secondary, and Vocational Education,
Committee on Education and Labor,
San Francisco, Calif.

The subcommittee met, pursuant to call, at 10 a.m., in room 13029, U.S. Federal Building, 450 Golden Gate Avenue, San Francisco, Calif., Hon. George Miller presiding.

Members present: Representatives Miller and Burton.

Also present: Representative Stark of California.

Staff present: John F. Jennings, counsel; Dennis Houlihan, research assistant; and Carol Hatch, staff assistant to Congressman Miller.

Mr. Miller. Good morning.

The Subcommittee on Elementary, Secondary, and Vocational Education will convene for the purposes of receiving testimony on legislation encouraging greater inclusion of computer sciences, computer education, and job training in our elementary, secondary schools and on a companion piece of legislation introduced by Congressman Stark to provide incentives for the computer industry, and technology industries, to make available to our teaching institutions updated, modern equipment on which young people can be taught computer literacy, and job specific skills, hopefully to provide a pool of skilled individuals to come forward and take their place in the next generation to help develop these industries, to help American industry stay current and maintain a position of leadership in a worldwide market. Obviously, these are industries in which California has a great deal at stake. My colleagues and I believe we must make every effort to see that this resource, which has been developed in this State over the years, is not diminished because of the failures of our educational institutions to be able to respond to its employment needs because of the cutbacks that they have sustained in the last several years or other inabilities to respond to the need to develop what is becoming an overwhelming gap in this field: The lack of people who are ready to take their place in this marketplace.

[Text of H.R. 5820 follows:]

I

97TH CONGRESS
2D SESSION

H. R. 5820

To amend the Vocational Education Act of 1963 to make incentive grants to the States for electronic and computer technician vocational education programs.

IN THE HOUSE OF REPRESENTATIVES

MARCH 11, 1982

Mr. MILLER of California (for himself, Mr. BEILENSON, Mr. CORRADA, Mr. DYMALLY, Mr. EDGAR, Mr. EDWARDS of California, Mr. FAZIO, Mr. FLORIO, Mr. FOGLIETTA, Mr. GEJDENSON, Mr. GORE, Mr. KILDEE, Mr. MITCHELL of Maryland, Mr. MOTTL, Mr. MURPHY, Mr. PANETTA, Mr. RICHMOND, Mr. ROYBAL, and Mr. STARK) introduced the following bill; which was referred to the Committee on Education and Labor

---

A BILL

To amend the Vocational Education Act of 1963 to make incentive grants to the States for electronic and computer technician vocational education programs.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That this Act may be cited as the "Electronic and Computer Technician Vocational Education Incentive Grants Act".

FINDINGS AND PURPOSES

SECTION 1. (a) The Congress finds that—

(1) the growth of the electronics and computer industries is essential to the improvement of all sectors

of the domestic economy, including the defense industry;

(2) the expansion of these industries within the United States is dependent on their ability to attract competent employees;

(3) there is a severe shortage of skilled technicians available to these industries despite large numbers of job opportunities;

(4) the vocational education system has not been able to keep pace with rapid technological advances in these industries; and

(5) there exists the potential for a strong partnership between vocational education programs and private industry to produce the trained technicians for expanding job opportunities in this field.

(b) It is the purpose of this Act to—

(1) increase the number of citizens with the technical training which will be required of workers in coming years;

(2) provide incentives to States to encourage the development of vocational education programs to train individuals for jobs in the electronic and computer industries;

(3) assure the participation of industry in the development of such a vocational education program

through shared responsibilities in curriculum development and financing; and

(4) assure the job relatedness of the programs authorized in this Act in order to target vocational education programs toward expanding and innovative sectors of the national; economy.

SEC. 2. Part A of title I of the Vocational Education Act of 1963 (20 U.S.C. 2330 et seq.) is amended by adding at the end thereof the following new subpart:

"Subpart 6—Electronic and Computer Technician Training Incentive Grants

"ELECTRONIC AND COMPUTER TECHNICIAN TRAINING INCENTIVE GRANTS

"SEC. 155. (a) From the sums made available for grants under this subpart pursuant to sections 102 and 103 the Secretary of Education is authorized to make grants to States to stimulate the growth of and assist States in conducting vocational education programs to train individuals as technicians in the fields of electronic and computer technology in accordance with this subpart.

"(b) Grants to States under this subpart shall be used, in accordance with five-year State plans and annual program plans approved pursuant to section 109, solely for vocational education programs for the training of individuals as technicians in the fields of electronic and computer technology. No part of any such grant may be used for job placement, or for training or employment stipends.

"(c) In each year of participation in the grant program under this subpart, a State shall commit the following percentage of its basic grant (under subpart 2 of this part) to programs under this subpart:

"(1) at least 2 per centum in the first year;

"(2) at least 4 per centum in the second year; and

"(3) at least 6 per centum in the third year and each subsequent year.

"(d) In evaluating training program proposals of eligible recipients each State shall consider—

"(1) public and private sector demand for personnel with the skill level and type of training proposed;

"(2) adequacy of training opportunities in such skill areas;

"(3) level and degree of industry participation; and

"(4) probability of trainees successful completion of proposed program based on program design and eligible recipient's previous experience with electronic and computer technology training.

"(e) Federal funds made available to an eligible recipient under this Act (including funding under this subpart) for programs under the subpart may not exceed 25 per centum of such eligible recipient's proposed budget for electronic and computer technician training under this subpart.

"(f) Funds under this subpart may be made available to an eligible recipient only if such recipient—

"(1) uses such funds only for job-related training which involves a comprehensive course of instruction designed to prepare individuals for employment in a specific electronic or computer technical occupation;

"(2) obtains at least 25 per centum of its projected budget for electronic and computer technician training through the financial support of the electronics or computer industry; and

"(3) obtains at least 25 per centum of its projected budget for electronic and computer technician training through non-Federal public vocational education funds.".

SEC. 3. (a) Section 102 of the Vocational Education Act of 1963 is amended by adding at the end thereof the following new subsection:

"(e) There are also authorized to be appropriated $50,000,000 for fiscal year 1983 and for each succeeding fiscal year for the purpose of carrying out subpart 6 of this part.".

(b)(1) Section 103(a)(2) of the Vocational Education Act of 1963 is amended in the first sentence by striking out "and (d)" and inserting in lieu thereof "(d), and (e)".

(2) Section 103(b)(2) of such Act is amended in the first sentence by inserting "and section 102(e)" after "section 102(b)" and by inserting "and section 155, respectively" after "section 140".

11

Mr. **Miller**. At this point I would like to introduce Congressman Stark who also has, as I mentioned, a companion piece of legislation in this field, for opening comments.

Mr. **Stark**. Thank you, Mr. Chairman.

I am pleased to be asked to join this illustrious subcommittee in examining ways that high technology education can be promoted.

Suffice it to say that I would sit before the committee in the audience as a technological 1937 Packard. I am a graduate of the country's—with all due respect to some institutions in the State of California—the country's finest engineering school, MIT, in Cambridge, Mass.

It occurs to me that I graduated from that institution knowing nothing more complex than how to operate a slide rule. I am a computer illiterate in an age when computers are rapidly becoming both an educational tool, a part of our entertainment and, indeed, becoming robots which are really, as I understand it, computers with a pneumatic arm added to the end of the computer.

I think that to miss the fact that the velocity of change is increasing so very rapidly at the end of this century, and not to prepare young people to participate, is to invite disaster on several fronts: cultural, technological, economic; indeed it is the equivalent of technological suicide.

I would commend the legislation that Chairman Miller—cosponsored by my illustrious colleague, Mr. Burton—introduced. Mr. Burton is the only person, I might add, who can provide the function of a computer with a 99-cent calculator.

I am still looking for the boundaries of my district over in the East Bay, but if we could bottle that talent, we could probably sell it and copyright it and distribute it through the computer software people, but he has not let us in on the secret.

I do think in all seriousness the legislation we are here to discuss today can be a tremendous addition and perhaps deal in a more down-to-earth way with the question that the President has asked many times, as he waves a newspaper in the air, saying, "Where are all the people to fill these jobs?"

I hope what we can do is to say there aren't many people who are able to fill the jobs because of some failure in our system to provide them with the litcracy and the talents to fill those jobs.

I think perhaps we can make a step toward ending that failure in the hearings today. I appreciate being invited to attend.

Mr. **Miller**. Also joining us this morning is our colleague—close to ranking member on the Education and Labor Committee, Congressman Phillip Burton from San Francisco.

Phil?

Mr. **Burton**. Thank you very much, George. I would like to commend Chairman Miller for having the wisdom to provide a forum for this hearing on his legislation and that of Congressman Pete Stark.

This is a very, very important issue. This generation of young people cannot possibly in toto be fully equipped to deal with the computer age of tomorrow and the tomorrows to come without us assuring that they have access to adequate training and understanding in their secondary, high school and, for that matter, I suspect even elementary school experience.

I am very pleased you visited our fair city, giving the people here in the San Francisco Bay area an opportunity to be better informed on this issue.

Mr. **Miller**. Thank you.

Our first witness will be Mrs. Patricia Langlin, director of vocational education, State of California.

STATEMENT OF PATRICIA LANGLIN, DIRECTOR OF VOCATIONAL EDUCATION, STATE OF CALIFORNIA

Mrs. **Langlin**. Good morning, Congressman Miller, Congressman Stark, and Mr. Burton. Thank you very much for the opportunity to be here before you today to give testimony on your bill, H.R. 5820, the Electronic and Computer Technician Vocational Education Incentive Grants Act.

I am Patricia Langlin, State director of vocational eduation and assistant superintendent of public instruction for the State of California.

The purpose of your bill is to stimulate an increase in the partnership between schools and industry for training of electronic and computer technicians to help relieve the serious labor shortage facing many high technology companies.

The purpose of this bill addresses one of our immediate and very real needs which our schools and business/industry have in California.

I fully concur with the findings by Congress which are stated in the bill that will strengthen vocational education programs in these two areas that are indicative of the greatest growth areas at the present time and for the immediate future.

The electronic and computer industries have a shortage of trained competent employees in this area and we also recognize how important it is for vocational education to establish a strong partnership with business and industry in order to help provide those people for the job market.

I would like to give you a couple of examples why I think California is already doing some things that are in line with this and this bill would help us to strengthen. I am sure you have read of our Governor's initiative within his budget for the improvement of computer instruction, along with math and science.

That is, however, perhaps aimed at a slightly higher level and we think this one complements that.

You are also asking for a commitment from the basic grant to programs in this area. California is willing to make that commitment through the State department of education.

During the past 2 years we have established funding pools for the secondary schools to encourage the growth of new programs in new industries and emerging industries. We feel very strongly that electronic area and computer technology certainly fall within that target area.

Within the community college, we have recently funded selected programs along the same general area, such as computer aided machining, drafting, computer repair, and technician.

We have a broad and diversified vocational education employment and delivery system that includes secondary schools, regional occupational centers and programs, adult schools, and community colleges.

Although vocational education funds in the past have not been used in all of these, some of them are supported with State funds. We believe that the H.R. 5820 funds could be used by any and all of those deliverers, depending upon where the program was best offered and for whom it should be provided.

All of the producers within our vocational education delivery system use community based resources whenever it is possible to do so. That means including buildings and equipment of industry and business, which gives us instruction to be current with business and industry needs, and also helps for vast savings by not having to duplicate purchasing of equipment which is already in use.

We are strong advocates of using business and industry personnel in determining the planning and operational needs for our vocational programs.

This includes their involvement in establishing or modifying curriculum as well as placement of qualified program completers.

I have also read with great interest H.R. 5573 by Congressman Stark which would allow for tax rebates for contributions of computers and other technological equipment.

I realize there are other programs within schools besides vocational education, but I think it would be very interesting if these two bills could perhaps somehow become a comprehensive plan to provide the instructional programs in the areas in which it is needed.

One of the reasons why vocational education programs have not been able to keep pace with technological change is the high cost of programs, including equipment and staff development.

In light of the reduced available resources at the program operation level, these are very real problems. We have to be fully cognizant of these local resource limitations and needs and to help write or support legislation which reflects this. I am pleased to see that H.R. 5820 is additional incentive funding and that it is not taking away from the basic funding of vocational programs and services.

I want to commend you, Congressman Miller, for directing the emphasis of this legislation to the training programs for the technician level within the electronic and computer industries.

Too often in the past have we identified the need for training for occupations which require baccalaureate and post-graduate degrees. My words are not intended to ignore the importance of the engineer and the programer, but, instead, to recognize the need for and importance of the working personnel in the entry and mid-occupational levels to support those advanced programs.

I think the ratio is something like three or four technicians to one or two of the professionals.

Again, I would like to express my appreciation to you for being given the opportunity to testify before this committee.

[The prepared statement of Patricia Langlin follows:]

PREPARED STATEMENT OF PATRICIA B. LANGLIN, ASSISTANT SUPERINTENDENT OF PUBLIC INSTRUCTION AND DIRECTOR OF VOCATIONAL EDUCATION, STATE OF CALIFORNIA

Congressman Miller and members of the hearing panel, I am very pleased to have been asked to provide testimony on H.R. 5820, the Electronic and Computer Technician Vocational Education Incentive Grants Act.

I am Patricia B. Langlin, State Director of Vocational Education and Assistant Superintendent of Public Instruction for the State of California.

The purpose of H.R. 5820 is to stimulate an increase in the partnership between schools and industry for training of electronic and computer technicians to help relieve the serious labor shortage facing many high technology companies. The purpose of this bill addresses one of our immediate and very real needs which our schools and business/industry have in California.

I fully concur with the findings by Congress which are stated in the bill that—

The growth of the electronic and computer industries is essential to the improvement of all sectors of the economy;

The expansion of these industries within the United States is dependent on their ability to attract competent employees;

There is a severe shortage of skilled technicians available to these industries despite large numbers of job opportunities;

The vocational education system has not been able to keep pace with rapid technological advances in these industries; and

There exists the potential for a strong partnership between vocational education programs and private industry to produce the trained technicians for expanding job opportunities in this field.

Not only is there interest and an apparant willingness to earmark new resources to address this need from the federal level of education, but that interest is also expressed in California. Currently, our Governor—Jerry Brown—has an initiative within his budget for the improvement of computer instruction, along with math and science. This initiative has elements which begin in the elementary level through the community college level; with a very strong component involving our Employment Development Department.

H.R. 5820 would require states to commit in the first year at least two per centum of its basic grant to programs in this area. I would like to clearly state that the California State Department of Education is willing to make that commitment.

During the past two years we have established funding pools within the federal vocational education funds to encourage local education agencies to plan for and secure necessary equipment to operate new and emerging occupation programs.

Clearly, the electronic and computer technician occupations are within this target area.

Additionally, we have just recommended for funding approximately $800,000 of projects at six community colleges for: computer aided machining; computer aided drafting; service technician—computer repair; and digital logical/micro-processing technician.

These projects will be funded using federal VEA monies, federal CETA monies, and state CWETA monies.

In California, we have a broad and diversified vocational education employment training and delivery system. This includes the secondary schools, regional occupational centers/programs, adult schools, and community colleges. H.R. 5820 funds would be used by any and/or all of these deliverers depending on where the program was offered and for whom.

All of the providers within our vocational education delivery system use community-based resources—including the buildings and equipment—which are used by business and industry. Not only does this provide the instruction to be current with business and industry needs, but it also provides for vast savings by not needing to duplicate purchasing of equipment which is already in use.

We are very strong advocates of using business and industry personnel in determining the planning and operational needs for our vocational programs. Clearly, this includes their involvement in establishing and/or modifying curriculum, as well as placement of qualified program completers.

I also read with great interest H.R. 5573 by Congressman Stark which would amend the Internal Revenue Code of 1954 to encourage contributions of computers and other technological equipment to elementary and secondary schools.

I fully recognize that there are instructional program areas within the school system in addition to vocational education. Isn't it interesting though to ponder for a while on how the computer and technological equipment which might be donated under H.R. 5573 might be used in a comprehensive manner by several instructional program areas in the same communities where funds from H.R. 5820 are used.

Obviously, one reason why vocational education programs have not kept pace with technological change is the high costs of programs—including equipment and staff development. In light of the reduced available resources at the program operation levels, these are very real problems. We have to be fully cognizant of these local resource limitations and needs and to help write or support legislation which reflects this.

I am very pleased to see that H.R. 5820 is additional incentive funding and that it is not taking away from the basic funding of vocational programs and services.

I want to speak very positively to Congressman Miller for directing the emphasis of this legislation to the training programs for the technician level within the electronic and computer industries. Too often in the past have we identified the need for training for occupations which require the baccalaureate and post graduate degrees. My words are not intended to ignore the importance of the engineer and programmer, but instead, to recognize the need for and importance of the working personnel in the entry- and mid-occupational levels.

Again, I would like to express my appreciation for being given the opportunity to testify to Congressman Miller on H.R. 5820.

Mr. **Miller**. Thank you, Pat. Let me ask you, outside the scope of these two pieces of legislation, there are obviously other efforts. There has been considerable concern expressed time and again by both people in industry and people within the educational institutions about this problem, but, as you read the literature and analysis of what is happening, the expressions of concern are far greater than the response to date.

I just wondered if you could outline the current barriers? Congressman Stark and I have tried to address two that work within the current system. Our legislation will work to eliminate both the barrier of the cost of the equipment for the schools and also to try to develop program and personnel to direct young people in that direction.

In terms of the current barriers, how do those rank? Generally you ask this question in education; you get back the barrier is money. We have had some people express concerns that technical people haven't always been able to be used because they don't have a credential or we are not able to use talents that currently reside within the schools, if you will, because they are not vocational education credentialed so that you can't take a physicist and transfer him over to develop a science-based course for vocational education.

Mrs. **Langlin**. We do have some of those problems. However, I think right now there are many efforts going on in California—and I am sure other places in the country—to try to alleviate that through in-service training programs. I will give you one example.

The business education staff within the State Department of Education has established through business education learning centers at three or four State universities in California a computer literacy program to try to train teachers, not only business education teachers, but other teachers, so that they will become computer literate and then be able to go out and do some training.

We have specialized credentials that enable us to use people from industry in teaching. They do have to get a credential and they have to go through a process. But we do have a special designated subjects credential, I think is the proper title, that enables us to use them as rapidly as possible.

Mr. **Miller**. Does it matter how limited use—do they have to have that credential if they want to work in the schools 2 hours a week or 6 hours a week?

Mrs. **Langlin**. They do have to have a credential or eight in the process of getting that credential, yes. So that is a problem.

However, in many instances there is a teacher—for example, a regional occupational center who uses—incidentally, that would correspond as close as anything we have to the skill centers that the gentleman from Pennsylvania described to you a couple of weeks ago.

We do have many community-based programs where there is a teacher from the regional occupational center, but the people at the facility are also used to assist in that training. The teacher from the ROP is the credentialed individual. They may get in-service training themselves from the people in the industry, so you have a mutual partnership there. That also helps to eliminate part of that money barrier. I would agree that money is probably the biggest barrier. I think—but the partnership helps by using industry sources wherever possible.

Mr. **Miller**. Thank you.

Pete?

Mr. **Stark**. I am just curious about whether in California or other parts of the country, Mrs. Langlin, how many kinds of archaic and useless trades are still taught?

Do they still teach typesetting, things where really there aren't very many letterpress printing operations left in the world?

Is that still taught in vocational schools the way it was when I was a kid?

Mrs. **Langlin**. I can't tell you about the rest of the country. I think California is rapidly getting toward the modern age.

I am sure that I could still find for you some of the programs that you are talking about, but wherever possible, and whenever possible, we encourage schools, through the use of the advisory committees that they have with industry, to bring those programs up to date. The more successful and utilized the advisory committee is with industry, the more appropriate and modern the programs are.

Mr. **Stark**. What would happen to the number of students in vocational programs if the requirement to enter a vocational program was tied to the number of job openings for the graduates?

In other words, if you are going to train bakers, admittedly it takes 3 years. So you have to project a little. If there are only openings for 100 bakers today in the State of California, somebody might say we ought not let more than 300 people enter the bakery program because, like lawyers, we might have a superabundance.

Is anything done to regulate the entry relative to the demand on the other end?

Mrs. **Langlin**. Yes. That is particularly true in the regional occupational centers and programs within the State of California. They have, of course, approval through the State Department of Education, and part of that means that they have done a job market search; that the labor supply, as well as the demand side, is looked at and many of them do an excellent job both using materials at the State level and the local level as well as what they do themselves.

Some of them even hire someone almost full-time. Those programs run better than a 95-percent placement record.

I just looked that up for a hearing that I have at the assembly next week. Overall, since 1978, the placement record of completers is better than 95 percent. I think that means they are training for jobs that are there.

Mr. **Stark**. One other area, and this is just an experience that I had years ago with the East Bay Skills Center, which I guess comes under the direction of our Community College District.

We were in this kind of a dilemma in the East Bay. We had a tremendous number of citizens who were illiterate in the most fundamental sense, probably not sixth grade educational level, but yet adults, and middle-aged adults, not young adults.

They have a program that was trying to train people in this particular case to become a bank teller. In the process, they got their GED.

You ran into a couple of problems. Banks were skeptical about these people who were—I hate to use the word, but they were nontraditional recruits, if you will, or applicants.

I was running a bank at the time. What we found is that if we had openings for 6 people, we would hire 18, with the understanding that at the end of 3 months or 6 months, 12 would have to leave.

However, our placement rate was great because once they had 6 months of experience other banks would hire them. If they had 6 months some place, as they did with us, and they could then get a letter of recommendation, you could move them out.

Is there any kind of program where as partners with industry you can provide on-the-job training and not have it cost industry so much that it is unprofitable in those very limited skill areas?

Mrs. **Langlin**. We use a community classroom approach, where students are trained partially in a classroom and then they go, for example, into the bank. That is a very good example. We have a large number of them in that. I am not talking about just tellers, but in computer centers. Orange County, in fact, has just built a new building—they haven't, Security Bank has. They asked the ROP to train something like 2,500 people for that facility.

They do use spots within the banking community, and they feel that they are willing to do that for the training. They have a teacher that is with them all the time, so they are not doing productive work, and yet the industry, like the bank, has the opportunity to see these students beforehand and then they also go out to other banks afterward, but they placed limited numbers in each one.

They used a lot of facilities for just a few students.

Mr. **Stark**. Thank you very much.

Mr. **Miller**. If you were to put on the competition for the few dollars we are talking about, the regional occupation centers—you mentioned the example in southern California—does it make sense to focus on those efforts in this kind of proposal that we are trying to get underway, or do you think it is a matter of districts coming up with proposals that would meet the criteria?

The legislation speaks obviously to letting districts come up with proposals, but we are not talking about a monumental amount of money at this point.

Mrs. LANGLIN. You will hear from a gentleman later on this morning who is a representative of one of those ROCP's. It would be my hope that if the money came into the State of California that we secured applications from all those people, gave them all the opportunity and then, depending upon the area in which the job market is and the one that can do the most for the least number of dollars, but do it successfully, those would be the people where the funds would go.

Traditionally ROCP's have not received Federal funds. I think in this particular type of program they would probably be more able to adapt quicker to use that money successfully.

In the State Department we certainly have no objection to that

Mr. MILLER. What kind of area are we talking about in California, geographically? The East Bay?

Mrs. LANGLIN. We have the whole State, almost without exception the districts are all within some regional occupational program or center, either operated by a county or operated by a group of districts that get together to do it.

Mr. MILLER. So at least in California you are talking about a statewide network that encompasses all the districts?

Mrs. LANGLIN. Yes, which is, again, what I think makes that program unique from the skill center we heard about before. It takes in school use, out of school use, adults.

Mr. MILLER. Thank you very much.

Mrs. LANGLIN. Does retraining and upgrading.

Thank you very much.

Mr. MILLER. Our next witness will be Steve Jobs, who I understand is here now and is chairman of the board of Apple Computer.

I understand you have a demonstration. Do you want to do that first or testify?

STATEMENT OF STEVEN P. JOBS, CHAIRMAN OF THE BOARD, APPLE COMPUTER, INC.

Mr. JOBS. We will testify and do this later on or during a break at sometime. It is really not part of any formal presentation.

Mr. MILLER. Why don't we do it right after your testimony?

Mr. JOBS. That is fine.

Mr. MILLER. Your entire statement will be put in the record.

Proceed however you are comfortable.

Mr. JOBS. Great. So I just don't have to sit here and read this?

Mr. MILLER. We hope you don't. Nobody gets read to like Members of Congress.

Mr. JOBS. I gathered that.

Mr. MILLER. I guess it is a problem we had when we were children. We couldn't go to sleep or something like that.

Mr. JOBS. Sorry we are late. We got caught in a traffic jam.

There's two tones to this whole subject of computers and education. One is sort of the apple pie, motherhood sort of stuff. The other is sort of the post-Sputnik crisis tone.

What I want to do is cover the second one first and then get back on some of the more philosophical issues to wrap up.

I think there is starting to become a little bit of a consensus that there is a revolution going on that shares some of the same magnitude as the industrial revolution.

I think most people are calling that an information revolution, a computer revolution; a third wave revolution, and it takes on different words; but the trends are pretty clearly visible.

I think if you just look at the GNP, information activities currently contribute a larger share of the GNP than manufacturing and agriculture combined.

About 75 percent of the jobs in the U.S. work force are now in the service sector and about two-thirds of the service sector is concerned with information.

About 50 percent of the work force in the GNP are now concerned with the information industries, and I guess it was the market research firm of Yankelovich, Skelly & Wright in 1980 which published an interesting statistic that the No. 1 occupation in the United States until the thirties was farming.

Because of the industrial revolution in the late thirties a laborer became the No. 1 occupation.

In 1979 it shifted to clerk.

As we look at U.S. productivity, most of us still think of improving productivity through improving the productivity of the smokestack industries. That is no longer where the majority of U.S. people work.

They are working in the information industries and the knowledge-based industries. If we are going to look at improving the productivity of those people, if we are going to look at bringing some of this revolution into those people's lives to improve the quality of their work environment or their home environment, we are really going to have to attack it from this new point of view rather than simply installing another robot at General Motors.

We first got interested in this as a company from two points of view. One was selling a lot of computers to education. We currently sell approximately 20 to 25 percent of our unit volume into the educational marketplace.

We started doing that really way back in 1978, into Minnesota, which was one of the flagship States in the country to adopt computer literacy as a requirement for their high school students.

California is also one of the leading States, sort of a bellwether State. As such, Governor Brown formed a thing called the California Commission on Industrial Innovation last year and asked Apple to participate. The first thing we did was, we obviously wanted to look at California in the eighties, where is it going?

We were able to identify approximately 44 percent of the new jobs in California in the eighties were going to come from the high technology sector.

We looked and said well, what things could further that, what things could hinder that?

The largest one always came back to education. We took a look at the education in California, which is one of the best States by comparison.

To cite some simple statistics, elementary school students in California average 44 minutes a week on science; only one-sixth of all the high school graduates in the United States have taken a junior or senior level science course; achievement scores nationwide have been declining since the sixties; only 15 percent of the male students and 7 percent of the female students in California take 3 or more years of high school science; and of course, as I am sure you heard from the AEA, the number of electrical engineering graduates has remained the same in the past decade despite a tremendous growth in these new sectors which are employing more and more people.

Our school systems fundamentally aren't providing the training that is required. The United States currently ranks fourth in scientific literacy right now behind Russia, Germany, and Japan. Russia graduates about three times as many engineers as the United States; Japan graduates more electrical engineers than we do, although they only have roughly 50 percent of our population, and you probably all heard the stories about the employment shortage in Silicon Valley.

In California again, as a result of proposition 13, 19 percent of the school districts have made drastic cuts in science programs; over 10 percent of them have reduced mathematics instruction as well since the passage of proposition 13.

One thing that seems to be across the board not only in California, but in most States, is that the money to purchase new equipment, the acquisition of state-of-the-art equipment in the schools, has been cut back to austerity levels.

We feel very strongly that we can play a part in getting some of this equipment back into the schools.

So that is sort of the post-Sputnik crisis side of the argument. The other side of the argument is that those of us that are engaged in working in this information technology—and I think many people throughout the country or the world now that have experienced it in their work environments or in their educational environments feel very strongly that the improvement in communications, that the improvement in the ability to dramatically offload a tremendous amount of what we normally call doing work from people and allow them to think much more conceptually and creatively, that the ability to customize and tailor educational experiences for individuals rather than feed them a standard homogenized educational experience are going to have radical effects in the eighties and the nineties and beyond.

We feel very strongly that it really is not appropriate to have one more generation of kids grow up without being literate in this new technology, any more so than it is appropriate to let a generation of kids grow up without becoming literate in the traditional sense today.

It is really not a matter so much from this philolsophical point of view of it being important to make everyone be technically literate, but rather considering the computer from almost a liberal arts point of view and saying this is a skill, this is a literacy that is going to be required by society at large in the future, not just calculators, not just bank teller machines, but being able to interact with these sophisticated information devices on a higher level.

So we are very, very much in support of the Stark bill and we, as a company, are committed to put a program together—assuming this legislation passes—which will get tens of thousands of computers in the schools throughout the United States, and we feel the impact of this program actually will be most significant on some of the schools in the poor economic environments, these schools which might not be able to afford this equipment were it not for some incentive for the manufacturers to help them.

We feel very strongly again that we do need to take some steps as a society to prevent any sort of split between the information or literate haves and literate have-nots from occurring as well.

We think things like this at the educational level could go a long ways toward insuring that.

We do feel the computer is at the heart of the information revolution and will be its fundamental skill, as verbal literacy is today.

We want to do everything we can to see this bill passed.

[The prepared statement of Steven Jobs follows:]

Prepared Statement of Steven P. Jobs, Chairman of the Board, Apple Computer, Inc.

Good morning. I am Steven Jobs of Apple Computer. I appreciate this opportunity to share with you my thoughts on technological education in the United States.

We in this country are in the midst of a revolution that is on the same order of magnitude as the industrial revolution. Fortunately, we have some insight into the nature of society that will result, and if we take the opportunity to plan correctly, we will enjoy a better life in the years to come. If we do not, we will produce a generation of Americans who will be unfit for the jobs that will be available 5 to 10 years from now, who will be non-competitive, and who will be essentially non-literate in the context of the society now evolving.

The revolution that is occurring is driven by advances in electronics and other technologies. It is bringing us to the "post-industrial society," or the information society. The information society will change people's mode of life as well as the work they do, and the demands on their intelligence and education.

The trends are clearly visible. Information activities currently contribute a larger share of the GNP than all manufacture and agriculture combined. About 75 percent of the U.S. work force is now in the service sector, and about two-thirds of the service sector is concerned with information. Thus approximately fifty percent of the work force and GNP are now concerned with information industries. Not long ago, most jobs were either in agriculture or manufacturing. Now the clerk is the most common occupation in the United States.

We are in an early stage of development in the sciences and technology of information processing. But we can nevertheless predict the nature of the skills an individual will need to succeed in the information society. We can also determine the skills industry will require of its employees.

Yet, not much is being done today to prepare for the future. The educational situation in the United States, is very disturbing:

In California, elementary school students average 44 minutes a week on science;

Only one-sixth of all high school graduates in the United States have taken a junior and senior level math and science course;

Achievement scores nationwide have declined since the 1960's;

Only 15 percent of the male students and 7 percent of the female students in California take three or more years of high school science; and

The number of electrical engineering graduates has remained the same in the past decade, despite a tremendous growth in the electronics industry.

So while we are clearly advancing towards an age where science and mathematics and technology training will be vital to success, our school systems are not providing the training that is required. These facts are even more distressing in light of our educational progress compared to other countries. The United States now ranks fourth in scientific literacy, behind Russia, Germany and Japan. Russia graduates three times as many engineers as the United States. Japan, with half the population of the United States, graduates more electrical engineers than we do.

Our achievements in Silicon Valley and the other high technology areas of the country had their roots in the investment in human capital that was made by prior generations. Our failure to continue that educational and entrepreneurial tradition may prevent us from building upon past successes.

The results of our decline is clearly evidenced by the shortage of engineers and technicians. The American Electronics Association projects that by 1985 there will be a deficit of over 100,000 engineers in the electronics industry. The current scarcity of trained technical personnel in Silicon Valley is well-documented.

But we are not remedying the situation, either in terms of scientific literacy or technical competence. In California, for example, 19 percent of the school districts in the state have made cuts in science programs, and 12 percent have reduced mathematics instruction since Proposition 13. This trend is no better in the vocational schools. One out of every four school districts in California has cut back on vocational education and industrial arts courses.

An important missing ingredient is money to purchase new equipment. Many schools throughout the country have been forced by budget restraints to cut equipment acquisition to austerity levels. The lack of new equipment in our school systems may soon impair the ability of our schools to offer state-of-the-art technology training.

The bills introduced by Representative George Miller and Pete Stark are both excellent Congressional initiatives to address these problems.

Congressman Stark's bill, The Technology Education Act of 1982 (H.R. 5573) is of particular interest to us at Apple because it provides a means whereby the private sector can participate directly in improving technology education. An identical bill, S. 2281, has been introduced in the Senate by Senator John Danforth.

The Technology Education Act of 1982 offers a liberalized charitable contribution deduction for donations of computers to elementary and secondary schools. The effect of this bill is to provide a sharing of costs between government and industry. Government would bear most of the direct costs and industry would bear most of the indirect costs.

However, the governmental costs are more than compensated by the fact that the value of the equipment received by the schools will far exceed the revenue loss to government.

If the bill is enacted into law, Apple has committed to give a personal computer system to tens of thousands of schools throughout the United States. The impact of the program will be most significant in the poorer school districts where budget constraints have been felt more severely.

A computer in the classroom will help to bring us back on the road to scientific literacy and, more importantly, to initiate our children in computer literacy. The computer is at the heart of the information revolution. Computer literacy in the late 1980's and beyond will be as fundamental a skill as verbal literacy is today.

Passage of The Technology Education Act of 1982 is one way of having an immediate impact on our school systems. Let us begin now by the enactment of this bill into law.

Mr. Miller. You talk in your statement of a revolution on the same order of magnitude of the industrial revolution, and you talk—you also mention that you think it will have radical effects on this society.

Just off the cuff, in terms of an assessment, how serious do you think the gap is between the response of the educational institutions and your industry?

You have obviously been very successful in your industry. You obviously are looking for people to employ and you are also looking for places to employ your equipment.

Mr. Jobs. Sure.

Mr. Miller. How serious do you think the gap is?

Mr. Jobs. I don't exactly understand the question. You are saying how big a job do we all have to do?

Mr. Miller. Yes.

Mr. Jobs. Well, it is going to happen sooner or later anyway.

I can recall back in 1972 when the first hand-held calculators were introduced. I remember at Berkeley several professors were prohibiting students from using them in the science classes because some felt it might give the students who have the $400 to buy one an unfair advantage over the other students.

Some professors felt it was inappropriate. Some professors were a little scared of the technology. If you go to Berkeley today, basically a decade later, that technology has so infused the education environment that it is passé.

Nobody would ever notice a calculator in a class.

The technology we are talking about here is, I think, not a specific purpose technology. It is not as simple to understand as a calculator. Its effects are going to be far more reaching. I think we can look at a longer timespan than a decade. I think most people would agree certainly within a 20- to 25-year timespan, the technology we are talking about here is going to become integrated into society and very familiar tools which everybody understands to such a level that really it won't be noticed any more.

We won't be having hearings like this about how to help it along.

I think that will happen in a 20- to 25-year timespan without any significant special help on the part of things like this particular bill.

Our goal is to see it happen sooner than later. I think the reaction we have gotten from almost every educator and institution we have talked to has been overwhelmingly favorable. So I think it will happen fairly quickly.

Mr. MILLER. You talk about—and there is obviously an awful lot of economists who would agree with you—the issue is no longer the productivity of General Motors; the issue is the productivity in another part of the sector, which you call the information part. But within that I also assume that the extent to which productivity can be helped at General Motors, you are talking about a future generation that is using computers in terms of smart machines. We have heard people testify at our committee in terms of investment they would just as soon invest in a smarter machine and a less educated operator—that they think there is a potential there.

I am not sure that that is a fair tradeoff or even need be.

Mr. JOBS. Along with that smarter machine, they are going to need some smarter computer software people to program that smarter machine and they are going to need some smarter technicians to maintain that smarter machine when it breaks down.

It is not actually going to be so much a displacement of people as a retraining of people, a new level of skills that are going to be required to support this.

Mr. MILLER. Again if you are going to do that—if you are going to do that, if the economy does decide to take off—we don't know what the estimated time of departure is, but in the next few months or years, if it does decide to take off, and an investment is made, it would seem to me that companies that would be making that investment will be making an investment in the technology that currently may not have the work force or the infrastructure to support.

There's a lot of discussions in the automobile industry that of the unemployed there will be 150,000 who will be asked to never come back because the new investment in that industry precludes their coming back to work.

Mr. Jobs. That is correct.

Mr. Miller. But my concern is, where is the pool of individuals that will take their responsibilities, whether it is the programers, the maintenance individuals, the designers, or others?

Mr. Jobs. The employment pool obviously will come from two places.

The first thing we have to do is, we have to take a look at—make sure that the generation of kids we are educating now have these skills.

I think we can do that fairly rapidly.

The second thing which has a shorter term impact is, as you know, Business Week recently estimated there are going to be 40 million people in the American work force that need to get retrained over the next 20 years.

We have to focus on that retraining.

I think as an example we have been working with a few schools looking at programs whereby they install a computer center in the school which, during the day helps to educate young students in computer literacy and helps to educate business students rather than learning how to type.

They are learning how to use word processing and other sophisticated tools and during the evenings are helping with computer literacy training and retraining for adults who are willing to pay a small fee to get that training which will in turn help to pay for part of the computer center during the course of normal educational hours.

So I think there is going to be a little more synergy in the future between the retraining and the new training.

Mr. Miller. Pete?

Mr. Stark. Thank you.

I just wanted to give a little credit here, Steve.

Actually the Stark bill—is it Jobs or Joebs?

Mr. Jobs. Either way.

Mr. Stark. Should be the Jobs bill. It was Steve's idea. My committee was deluged for the 6 years I have been on it and the year or so I have chaired it with people from industry asking for just a little bit of a tax break.

I am not a very swift fellow in those areas. I, for years, have listened to the chairman of the board of an airline tell me for an extra tax credit he is going to buy a billion dollars' worth of airplanes.

What he doesn't tell me is, it is going to take about half the number of people to fly them once he gets them. The steel company says we need to modernize our steel plant because we are not productive, and they take their tax break and buy an oil company. They operate the oil company with the same people.

After a while even if you are not very smart, you begin to think that these guys are coming looking for a handout.

I have yet to find that labor-creating machine they are buying with all your tax dollars.

So I was equally skeptical when Steve came along. Steve was very straightforward about it. The idea of donating, which they have generously talked about doing, is not eleemosynary. Correct me if I am wrong. I don't think the stockholders of Apple ought to think they are going to be out of pocket. I think that it is an outstandingly good marketing tool. I think there is probably nothing I would rather—if I were a stockholder of Apple—to know than that every child would grow up seeing that logo in front of him. Steve was very up front about that. He said he hoped that—I guess I can mention competitors—I don't know if they are competitors, other manufacturers, Hewlett-Packard, Atari, whoever makes computers would be encouraged to get into the game and hopefully they would be encouraged to do that.

The bottom line is basically it would be a tax credit to the science industry, but the schools will be getting somewhere on the order of, let's say, two for one. In other words, if we are going to spend the taxpayer's dollar, the schools are going to get two bucks worth of what I think is useful gear.

I think that it is both refreshing to have somebody approach us being very up front about their business interests in it and yet I think taking a very sophisticated look at the kind of benefits that the community will get from it. That is in my book at least the kind of legislation where everybody gives a little bit and everybody gets a little bit. If we could write tax law like that more often, I would be a lot happier legislator.

As a matter of fact, the deficit might be a little narrower. I just want to congratulate you for an idea I think is going to go through with a lot of bipartisan help.

I have been led to believe from people in your industry, with other people supporting it and finding a way not to dump old inventory, but to find interesting, useful equipment that will have a multiplier effect in getting people into a whole host of sciences—biological and medical sciences, and perhaps even into the social sciences.

They will just be more adept at it. You are to be commended.

I am kind of excited because, as I said earlier, I am an example of the computer illiterate. For me it is like getting an early look at the 21st century in terms of what, at least my grandkids will get a chance to participate in.

I appreciate your efforts on that part. A couple of quick questions.

I don't mean to commit you to something, but the question has come up recently whether private and/or religious nonprofit institutions would be included as a possible recipient of your——

Mr. JOBS. Right.

Mr. STARK. All right.

The other question people have brought up is—and people generally say no, it isn't, but you and I originally talked about limiting this to a year.

Mr. JOBS. Yes.

Mr. STARK. For the general public's information, by limiting these types of tax incentives, you get people to hurry up and do it. If it is there forever, it may never get done, so you have a cut-off date.

However, does that impose a limitation perhaps on your competitors who haven't thought about this as you may have?

Would there be a real need to extend it longer? Is it possible it ought to be 1½ or 2 years?

Do you see any reason for the year?

Mr. Jobs. First question first.

We very actively are recommending—and our program would address—all accredited public and private schools in the United States, which are approximately 103,000 by our count—all accredited schools at all levels. That makes it very, very simple.

We feel there are kids in all of those schools. That is what we ought to do.

The second question, first of all, I think all of our competitors know about this program. The Wall Street Journal has been kind enough to give us a little bit of press. I notice Time magazine is here. I notice Atari is in the room. I personally have briefed Donald Estridge, the General Manager of IBM's personal computer systems division in Boca Raton, Fla.

I think everyone knows about it. I think there is certainly adequate time to prepare for each manufacturer to put a particular program together.

The second thing I would like to point out is our major competitors in the industry are Tandy, Radio Shack, Atari, IBM, Xerox, and others, all of which are far larger than Apple is.

Relative to our competitors, I certainly don't think we have any economic or manufacturing muscle-type of advantage. I have gotten very good reception from our competitors on this bill as well.

So I think that will be—that will go very smoothly.

The other part of that is, we feel very fortunate in the sense that this bill is really standing on the shoulders of legislation last year which allows a little bit of an incentive for contribution of scientific equipment for research purposes to universities and liberalizes that restriction to go down to other institutions—other levels of education and also removes the research equipment.

Our feeling is very strongly that if this works as well as we think it is going to, it is going to be very obvious to everyone within 12 months that it is working.

At that point in time, if—you know, if the group of individuals responsible feel that it is working well enough to extend it, it will be much easier to do, I think, standing on the shoulders of existing legislation than, as you point out, trying to pass something ad infinitum.

Mr. Stark. I suspected the reason. I helped write that 1981 bill where we made available donations for research to universities, that that is just kind of the traditional thinking; that is where all scientific knowledge is learned, in Ph. D. programs. It just never came up.

Certainly nobody questioned grammar schools. They certainly didn't bring up either vocational education or secondary schools at all. I think it was just our being really not very aware of how scientific knowledge is generated and assimilated.

Mr. Jobs. It is also being transferred down to lower levels of education.

As an example, I am on the board of trustees of a university in Grinnell, Iowa. These are traditionally the colleges that have not had a large computer science department, don't have degrees in engineering, are much more liberal arts than what one might suspect would be interested in computers. Yet both of these colleges have invested fairly heavily in microequipment not only used in the sciences, but also in psychology and a lot of other departments.

The key thing there is that computer literacy within a few years at both of these schools will be a freshman requirement. What they would really like to do is push that down into the high schools so that students can come prepared with these skills and they really don't have to spend their very expensive time and students' very expensive money teaching them how to use things that they really could be learning as effectively in high school or potentially even grammar school.

So there is definitely a trend in that direction as well.

Mr. **Miller**. Let me ask, is it conceivable that under your legislation—you talk about 103,000 schools—that a school might be the recipient of equipment from more than one manufacturer? There is nothing in the legislation that would prohibit that?

Mr. **Jobs**. No, and I think that is likely. We are suggesting for consideration in the legislation that there be a limitation of one system per manufacturer per school which I think would tend to encourage the manufacturers to geographically disperse systems rather than give a ton of systems to the schools that might happen to be in their immediate vicinities, and really encourage a broader demographic distribution.

I don't think that is mandatory. We think it would be a good idea.

Mr. **Stark**. Doesn't that address the problem of poor schools?

Mr. **Jobs**. Yes, that is the key thing of why we would like to see wide distribution.

I see no reason why schools shouldn't be able to get a whole variety of equipment.

Mr. **Miller**. Let's assume, for example, the program might run longer than a year. It might seem in this industry there would be a lot of reasons why it should run longer than a year.

One of the questions that has come up is the fact a school gets locked into its system which is then incompatible to shifting to another system and now they are locked into the expense of doing that because they don't like what they received through the mail.

So, in effect, that school could go out and seek the donation of that competing system?

Mr. **Jobs**. I can't speak for our competitors. I know the way our program will work is, it is going to be a dealer-based program.

We have approximately a thousand dealers in the United States. Schools are going to be able to go to any of those Apple dealers. He is going to be helping install the system, make sure they get up to speed on it, have the appropriate training classes set up.

It will be easy for any school to gain access to an Apple system under this program.

Mr. **Stark**. I thought the congressmen were going to be able to deliver them to the schools in their district.

Mr. **Miller**. In your case, Pete, you are. As a matter of fact, they have to come pick them up.

Mr. **Jobs**. I guess the other thing is that this bill basically to us represents a sort of cooperation between the public and the private sector, which I think is real healthy in this current economic environment.

The education market currently for microcomputers is reasonably competitive. There is a fair amount of competitive bidding that currently goes on too. So I think the private sector, the natural mechanisms of the private sector will insure that any follow-on systems they want to buy will be priced as competitive as possible.

Mr. MILLER. Back to the incompatibility problem. Does the legislation allow the same kind of treatment for software as opposed to the hardware?

Mr. JOBS. Yes.

Mr. MILLER. So again a school that accepts a system has at least some reasonable expectation that they may be able to continue to upgrade that as new software comes on line?

Mr. JOBS. Absolutely.

Mr. MILLER. So they are not stuck?

Mr. JOBS. Correct. It is part of our plans as well to go to several of the software companies and solicit them to participate with us in this program by allowing us to, on a royalty-free basis, duplicate their software and give it to the schools as well. We are going to try to encourage those companies that write really good educational software that happens to run on our systems to participate with us in this program and get the software directly into the schools.

Mr. MILLER. So in effect at least what you have in mind is really the presentation of a system, not simply the hardware that gets put into a single school room and may or may not have the support for it?

Mr. JOBS. Yes. We use that word system quite frequently. We very much believe there is a combination of hardware and software and manuals and training and even setting that is going to make this thing successful from our point of view.

We intend to address each one of those. The objective is not to have a computer sitting in a closet.

Mr. MILLER. You know, we had some rather bad experiences when in the early days of title I we were going to provide a lot of video—well, there weren't video recorders in those days. Projectors and tape recorders and various teaching aids. They are in the closets in many districts. It didn't work out terribly well. Perhaps the fact that you have to make the decision on whether or not you are going to make that donation to the schools may prevent that from happening, that there is some resource in place.

Again in the literature, obviously there are an awful lot of schools throughout the country where there is not the human resource to develop the use of the technology. They don't have somebody who is literate in computers with the ability to translate that knowledge or translate that knowledge to the youngsters.

Maybe we can employ the youngsters. They seem to be way ahead of us.

Mr. JOBS. A lot of them are starting to employ themselves. I ran into a 12-year old kid in Chicago about 6 months ago that has just started a software company with his more mature 13-year old friend called Aristotle Software. They now have three products on the market. They are probably making about $10,000 a month.

Mr. MILLER. Gee. No. GTE.

Maybe if we just stay out of their hair they will do just fine.

Do you want to go ahead and show us your presentation?

Mr. **Jobs**. Thank you very much.

Mr. **Stark**. Thank you for being here.

Mr. **Miller**. We will recess for a couple of minutes.

[Recess.]

Mr. **Miller**. The subcommittee will reconvene.

The next panel we will hear from will be Mr. James Conway, who is the president of Electronics Association of California; Gary G. Petersen of the Electronic Industries Association, the Human Resources Council, Manpower Task Force.

We would also like to move into this panel Mr. Steven Mayer, vice president of research and product development from Atari, whom I understand has a time problem with a plane, something I can relate to very clearly.

STATEMENT OF STEVEN MAYER, VICE PRESIDENT, RESEARCH AND PRODUCT DEVELOPMENT, ATARI

Mr. **Mayer**. Thank you very much.

I am Steven Mayer, vice president of research and product development at Atari's Research Laboratory in New York City.

I have been with Atari since its inception in 1972 and have followed the growth of the company and the industry of which it is a part, both from a vantage point of a participant and one who is keenly interested in computer-related education.

Atari, Inc. is a subsidiary of Warner Communications Inc. and is one of the fastest growing large companies in the world.

All of our products incorporate computer technology in one form or the other. The bulk of our employees live and work in this country. We believe that the electronics and computer industries form a key national resource, one that will become, with all its ramifications, the largest industry in this country, if not the world.

Helping to save that resource is the reason we are here.

H.R. 5820 is a good bill and we support it, but we also think there are three changes that must be made to achieve the impact necessary.

The first change involves the scope of the fields covered. To make sure all appropriate people and job classifications are included, we suggest the bill refer to "electronic, computer, and information processing technicians."

This may be a minor change, but will extend the bill to involve the full spectrum of workers in this field. This is key.

While hardware, its design, manufacture, service and operation is now the major part of the industry, that focus will change dramatically in the near future.

Already hardware manufacture and testing is becoming automated. Repair in this field will soon be mostly a task of swapping good parts for bad.

Software, including development and testing, word processing and system management is, however, moving rapidly into the forefront. Industry projections now indicate that software activities will employ ten percent of the population of the United States by the end of the century.

It will be the industry upon which most others are based, and it will remain people-intensive well into the 21st century. You can see that it is imperative that we maintain our lead for it to remain a uniquely American industry.

Other countries, including England, France and India, are already moving rapidly into this field.

The second change also involves the who of the bill, as well as the where. As written, H.R. 5820 speaks of vocational programs that only train our citizens for entry into this expanding field. Nothing is said of retraining, and we feel that a tremendous amount of retraining must be done in league with the essential initial training.

I am not just talking about people who have been in the work force many years, but people who have been pursuing a career for only a few years, who are caught up in the whirlwind of technological change, unprepared.

As to the where, the wording of the bill should not limit the location of the training to traditional vocational schools in institutional settings.

To provide the proper outreach, it must include training and retraining done in the workplace and in community programs wherever sited. We will find that this change will allow us to leverage our dollars more effectively.

For instance, Atari is now a major participant in an innovative project with the industry education council of Santa Clara County. This project involves using a specially-designed van that tours county schools to provide a variety of computer literacy programs to enhance the employability of the area's children.

Another of our programs involves providing computers and support to the future center of the Capital Children's Museum in Washington. There the focus is on reaching pre-school and primary grade children to guide them in their first steps to familiarity with the computer culture.

I might interject I also believe we are going to be providing training for Congressmen in the next couple of weeks. The center facilities are also available to all other age groups, but the prime mission of the center is to work with the younger set.

Both of these outstanding projects are being coordinated by the Atari Institute for Educational Action Research, an organization established by our company to initiate and support innovative projects in educational technology.

Last, we feel that the bill should not be so specific as to the source of the 75 percent of the funds that are to come from the State and the private sector. As written, the bill could put a straitjacket on the program. As an example, if Atari were to try to run the same training program in both California and New York, but one State could not raise its full 25 percent, the program might founder.

But if there were flexibility for Atari, an industry group, or perhaps a local governmental entity, to be allowed to make up that difference, the program might be saved. Or the bill might specify a range of percentage participation for each entity.

In addition, since industry is committed to provide 25 percent of the funds for these programs, we feel that they should be made tax deductible, and that this should be spelled out in the bill.

Inclusion of these changes would make H.R. 5820 an excellent instrument for the preservation and encouragement of this industry, which is destined to become such an important part of the future of the United States.

Thank you.

Mr. **Miller**. Thank you very much for your testimony. I won't hold you. If you have a time problem, you may leave.

I really appreciate you making specific criticisms of the legislation. That is most helpful.

Every now and then someone walks in the room and says I don't like it, it stinks, but they don't suggest any improvements. We will get back to you.

Mr. **Mayer**. I have a few minutes.

Mr. **Miller**. Let me just ask you in terms of when you say where the program is, I am not sure what you are suggesting there.

Mr. **Mayer**. For instance, it may include any 150 (c)(3)—I think that is the number—institutions who may act as a participating entity in this. In the specific wording of the bill, that it——

Mr. **Miller**. You are concerned it is restricted to educational institutions?

Mr. **Mayer** [continuing]. Yes.

For example, libraries have become very involved in training in computer literacy. We would like to look at that as a possible model.

There are many alternates that are arising now in ways that this training can be provided.

Mr. **Miller**. When you suggest the 75 percent is a problem where you might be running a similar program in two states, you say to make up the difference, what do you mean?

Mr. **Mayer**. Right now as it is written, it requires the participation of essentially three entities; the Federal Government, the States, and industry. In some cases, if the intent is to leverage Federal dollars most constructively and the State hasn't enacted legislation at a particular time but there are other institutions, either public or private, that could provide the balance of the 75 percent, we would like to see that kind of flexibility.

Also differences between States may cause significant problems for companies that are essentially national.

Mr. **Miller**. Thank you.

Mr. **Mayer**. Thank you very much.

Mr. **Miller**. Mr. Conway.

STATEMENT OF JAMES CONWAY, PRESIDENT, ELECTRONICS ASSOCIATION OF CALIFORNIA

Mr. **Conway**. I think the significance of what you are doing here is illustrated by the fact that the gentleman on my left is catching a plane to return to New York and the gentleman on my right is going to be following him in a few minutes to catch a plane to return to Chicago.

Certainly the significance and impact is visible here today.

Mr. Chairman, members of the subcommittee, I am James Conway, president and director of the Electronics Association of California.

Our testimony today is being presented on behalf of the association's 450-member companies, as well as the 380-member companies of the Electronic Industries Association, which is headquartered back in Washington, D.C., with which we are formally affiliated.

Accompanying me this morning is Mr. Gary Petersen, vice president of Human Rersources, and Administration, for the GTE Automatic Electric Co., and also chairman of the Special Manpower Task Force of the Electronic Industries Association Human Resources Council. Mr. Petersen has been active in the development of a comprehensive industry program to achieve the goal of increasing the supply of technical people available to meet the needs of the rapidly expanding electronics industry.

We are, both of us, pleased to have this opportunity on behalf of our organizations, to testify in support of H.R. 5820, the Electronic and Computer Technician Vocational Education Incentive Grants Act.

This legislation recognizes and offers partial solution to the widely recognized shortage of technicians in the computer and electronics industries. We fully support the concept behind the legislation which attempts to strengthen the relationship between industry and the vocational education system, and which appropriately intends to direct a share of Federal funds to states into training computer and electronic technicians.

The United States, in the 1980's and 1990's, will certainly be a nation of high technology, as we just heard from the last speaker, in the home, in the school, in the armed services, everywhere we look.

Today we are the world's leader in technology and we must maintain that lead for economic stability and national security.

We can only do this with a solid base of scientific and technological skills and literacy at all levels in the United States.

H.R. 5820 represents an effective step in addressing the serious shortage of skilled and technical manpower available to the high technology industries.

I would like to ask Gary to continue on with how he feels the bill can be aligned to be most effective for the industry and general comments about the problem we are wrestling with here in the United States.

STATEMENT OF GARY G. PETERSEN, CHAIRMAN, ELECTRONIC INDUSTRIES ASSOCIATION, HUMAN RESOURCES COUNCIL, MANPOWER TASK FORCE

Mr. PETERSEN. Thank you very much.

Let me add my thought that I am very appreciative of the opportunity of appearing before this panel this morning.

We have looked at the bill. We feel that a few changes in specific language in the bill would strengthen its intent and effect.

First, on page 2, lines 3 through 5, we disagree that "the expansion of these industries within the United States is dependent on their ability to attract competent employees."

Attracting them is really not the problem; instead, the industries' ability to expand is dependent on "a trained pool of personnel available for employment."

I think that is what the committee is really trying to get at.

Another section on page 3, the wording "assure that programs authorized in this act are specifically designed and related to identified job needs and openings in order to target vocational education programs toward expanding innovative sectors of the national economy."

Basically what we are talking about there is our experience is that the demand for any particular need, the demand for any particular skill in the United States is really dependent upon identified job openings and skill needs.

In the past I think we all realize that job-related necessities have become so broad that it is becoming really meaningless.

Also, on page 4, lines 13 to 16, we suggest the current language be revised to read, "Demand—defined as identified job openings or needs—for personnel with the skill level and type of training proposed."

The reasons for the above two changes are that job relatedness must be tied to specific job needs and opening that can be identified.

There is significant evidence that shows that unless specific job needs and openings are identified, there tends to be a wide interpretation of what job relatedness really is.

Also on page 4, lines 19–22, we suggest the current language be revised to read, "Probability of trainees successful completion of proposed program based on program design and eligible recipient's basic education skills and ability to assimilate proposed training."

The reason for this suggested change is that eligibility should not be based on any previous experience for several reasons: (1) Most eligible recipients will not have been exposed to the electronics or mainframe computer industries. (2) Eligibility should be based on whether or not the recipient has the capability for handling the training that would be proposed.

In addition to these specific changes, we would like to share some views and experiences relevant to general provisions in the legislation.

Speaking to job relatedness, it is the experience of our respective association members that training conducted within the vocational education system has not been relevant to employers' needs.

H.R. 5820 correctly attempts to assure the job relatedness of the programs which would be authorized under it.

The bill should also specifically address the issue of cooperative education.

In many instances, the best way to achieve the goal of job relatedness is to provide the student with a combination of classroom work and work experience.

EIA's Electronic Industries Foundation (EIF) conducts several programs which emphasize the importance of this cooperative education approach.

I would like to briefly summarize one such EIF program, Partners for the Advancement of Electronics (PAE).

Under the leadership of EIF and the New York City private industry council, a group of New York City electronic companies has undertaken a program to bring together educators and industry to provide more job-oriented education and training for high school students.

The program facilitates the transition from school to employment and meets today's industry job market.

Last summer 179 juniors and seniors from Westinghouse High School participated in an 8-week program of real work experience and classroom study. The students attended Long Island University for 2 days a week and then worked 3 days a week as employees for participating companies in jobs that related to their vocational studies.

The curriculum for the classroom portions of the summer program was planned and written by employers and educators, and was based in part on teacher visits to company plants to interview firstline supervisors.

This exercise in cooperation had many benefits, not the least of which was tailoring of classroom instruction to meet the industry's specific needs.

During the work portion of the project, teachers visited the worksites of the students and again talked with firstline supervisors about the continuing needs of the students working there. Teachers and supervisors alike were unanimously enthusiastic.

The teachers, primarily math and English, were able to see their training being used on the job and to develop new ideas to be used in their first semester classroom.

The summer work/study portion of the PAE project was the start of a continuing working relationship between educators and industry that will improve the relevancy of education and better prepare city youth to meet the specific needs of New York City electronic companies for educated, highly trained technical employees. All of the participating high school seniors available for full-time employment following the PAE summer project have been employed, many by the companies where they worked.

By any measure, the program has been a success.

One important element of the successful PAE program was the ability to pay stipends. When the student is working 2 or 3 days per week in industry, remuneration is essential.

We feel that your legislation could justifiably prohibit the use of Federal dollars for stipends, but suggest that employment stipends be allowed to be paid from the 25-percent private industry contribution, if so desired, when employment is directly relevant to the training.

If stipends are received, we urge that it be made clear that no student would lose other Federal income maintenance assistance for part-time work during the period of the training program.

In addition to straight financial support from industry equal to 25 percent of a program recipient's projected budget, we suggest that this provision be expanded to include other industry contributions such as administrative assistance, curriculum development, and program instruction.

It has been our experience as we go out to our various members, especially in the economic trough we are in, that a number of companies may not contribute or participate from a financial standpoint, but again, it has been my experience that a number of companies have capabilities; curriculum development, program instruction, administrative assistance, aids to various schools.

If the bill could be expanded in those areas, I am certain a couple of companies who might not be able to give a financial contribution might contribute in these other ways.

In closing, we would like to emphasize that whereas we fully support this bill as an effective measure to increase the supply of technical people to our industries, we believe strongly that the larger problem, which makes this kind of legislation necessary, and which needs serious attention, is the deterioration of our Nation's basic educational fiber.

Also, whereas our industry members willingly contribute resources to achieve the purpose of this legislation, we must point out that a very large corporate tax responsibility of those members is devoted to an educational system which is failing to be responsive to our Nation's needs for a populace which is literate in the maths and sciences.

The manpower program of EIA's Human Resources Council focuses on these problems of basic education vis-a-vis the outstanding job opportunities in the electronics industry.

Mr. Chairman, a short summary of the Electronics Association of California and the Electronic Industries Association is attached to our written statement.

Thank you for this opportunity to present testimony.

At this time Mr. Conway and I would be pleased to answer any questions.

[The summary referred to follows:]

SUMMARY SUBMITTED BY GARY G. PETERSEN, CHAIRMAN, ELECTRONIC INDUSTRIES ASSOCIATION

The Electronic Industries Association (EIA) represents 380 American companies. Most make and sell component parts, equipment, and systems for consumer, industrial, governmental uses. Others conduct research and development or provide contractual services pertaining to electronics.

EIA's membership includes companies of all sizes, ranging from very small, single-product businesses to large, multinational corporations.

The U.S. factory sales of electronic products are estimated at $117 billion in 1981. Over $23 billion of this was exported. That figure would be even higher if the electronic content in such equipment as airplanes and machine tools were to be separately identified.

Electronics manufacturing directly employs 1.6 million Americans. Of those jobs, at least 600,000 are tied to exports.

Last year, while the nation suffered a trade deficit, our industries generated a $4.5 billion trade Surplus.

To summarize:

U.S. ELECTRONIC EQUIPMENT AND COMPONENTS

[Dollar amounts in billions]

	1978	1979	1980	1981 estimated
Factory sales	$70.5	$85.4	$104.3	$117.0
Exports	13.4	16.7	20.1	23.3

U.S. ELECTRONIC EQUIPMENT AND COMPONENTS—Continued

[Dollar amounts in billions]

	1978	1979	1980	1981 estimated
Imports	10.7	11.8	13.1	18.8
Trade balance	+2.7	+4.9	+6.9	+4.5
U.S. employment (million)	1.292	1.436	1.57	1.61

Whether measured by production, trade or employment, the electronics sector is one of the major, positive factors in the U.S. economy.

ELECTRONICS ASSOCIATION OF CALIFORNIA

The Electronics Association of California is the fastest growing trade association in California and the only one focusing exclusively on the management and employee needs of rapidly growing companies in the electronics industry. The EAC was founded in 1977 for the sole purpose of helping firms leverage their collective strength to develop new employee and management services which are important to their individual companies. Since that time, over 450 firms in California have joined the EAC.

Mr. **MILLER**. Thank you.

In your closing paragraph, you know we have always had this problem, I suspect, as long as we have had a vocational education system, that there has been a separation within the facilities as to those people who are in vocational education and those people who are in general education programs.

In some cases there is discrimination against students who were not. At this point we seem to have arrived at a point where we are about to marry the entire institution. We are talking about vocational education training for students who are illiterate in math and sciences.

At that point the discriminatory aspects of this program or the—in some instances, the back seat to which job training and preparedness has taken over the traditional courses, the lines of distinction seem to be erased—or are about to be erased radically here.

I am interested because you make a very harsh comment on the educational institution as a whole in this instance. I wondered if you would like to expand on that in terms of whether this legislation or other proposals are going to work. It seems to me you no longer are pitting factions within the institutions against one another; people are not going to be able to beat their chests and say we are doing a wonderful job in vocational education, but you people in general education aren't doing too well.

At this point where that computer is located or where the human resources are located is not going to be terribly important any longer for this industry.

Mr. **PETERSEN**. That is absolutely true. It goes to your point that you made a while back when we had the first testimony on whether or not there are obsolete vocational training programs. That is probably true. We are probably helping to perpetuate those through our educational system, but the reason we are so supportive of this particular program, it addresses a need in industry; but more appropriately, I think it could address—it is the beginning of addressing a more basic problem.

That is the literacy in basic math and science. Because the people that we see coming into our industry really can't be effective people, employees, unless they are trained in basic math and science.

I think every one of the people that we have seen in the testimony here is getting at that basic element that no matter which segment, whether you are talking about literacy in computer science or literacy in the basic electronic industry, we cannot basically use people who are not skilled or more appropriately disciplined in such things such as basic science and math.

The mending of those two are really coming together. You really cannot get into the vocational training now without science and math. This was not true a number of years ago, if you looked at some of the old craft vocational training that we had. In some of our older industries—I have a personal experience right now. We are in a major revolution in the telecommunications industry basically marrying up the older telecommunications industry with the computer main frame.

What you are trying to do is taking very senior experienced people in industry who maybe have 15 to 20 years of experience on basic electromechanical craft skills, and now trying to bring them into more basic math and science. That is what it is.

When we eventually get up into electrical engineering, it all starts with basic science and math. So we see this as a way of helping our industry, but basically helping the people where you are going through this transition in industries and converting from mechanical into electronics.

Mr. **Miller**. It has been suggested by some people who have looked at the legislation within the education institutions who are obviously suffering from cutbacks, whether it is in this State because of proposition 13 or whether it is actions at the Federal level; and their comment has been that the generation that brought us Apple or Atari or to this point, they were the beneficiaries of the Sputnik era.

If you look at the ages of these people, you had a commitment, an investment made and we have been living off that initial investment for a period of time with no similar investment having been made for the next generation, that the student who is entering school today, who is 5, 6, 7 years old, at least at this point it doesn't appear that any kind of additional commitment is, in fact, being made so that they will bring us the follow-on and we will be living off what we—we are living off a deteriorating resource, however bright they are.

In today's arrangement, the follow-on is somewhat difficult to see. It is not that all of the new entrepreneurs, or the new scientists will be products of traditional education. Many of them will find their way there no matter what. We know that is true.

I just wondered if the two associations—is that conceivably correct, that that is what may be going on here in this instance?

The math and sciences—I was in the seventh grade when Sputnik was launched. I can remember the math teacher bringing in Time magazine and telling us what kind of day this was in our lives and telling us what this was going to mean to us.

I don't think I paid attention. I went to law school instead.

But I just wondered, in a sense that Mr. Jobs says we are talking—and the literature says we are talking about something that is, in fact, larger than the industrial revolution that we know turned the world.

I just wonder if, in fact, we are—all of the rhetoric in Congress about our ability to compete with our international trading partners, and yet I just wonder if your industry looks and says, is there any kind of commitment?

We can give tax breaks until hell freezes over, but there are still millions of kids who every day go to school and go through that system and come out the other end.

They are going to be available, ready or not.

Mr. PETERSEN. One of the things we are doing in our industry—and the point you are making is very valid—it desperately scares us, I think, as parents and business people, about where we are going in the next 10 to 15 years in the technology and the education for that technology.

Basically one of the ways that we are trying to address it within the industry is this manpower program. Our manpower program is one that basically is trying to desperately do at the grassroots level, to communicate two things: That is, the basic education failing we have in the United States and the opportunities that are there for high technology people.

Basically what we are saying, it is basically a failing of the basic education system.

I think some of the things that Steve Jobs and Congressman Stark—that is going to be a help, but basic to that is science and math.

I don't think that we can overemphasize getting a commitment and a discipline at the elementary and secondary school levels.

One additional thing at the national level we are concerned about is a lack of commitment on where we are going in basic education. If you look at what we are doing as opposed to what we are saying, it is that if you take a look at the funding for basic education through the National Science Foundation, we have been dropping at the same rate that the test scores in the United States have been dropping to the point that for basic education it is practically a pittance.

Part of that funding to the National Science Foundation, it seems to me, is a commitment or a standard of what commitment are we going to make for basic education in the United States to support.

I think one of your statement was the underpinning for this mushrooming technology. My opinion, that is not here in the United States. The underpinning educational support for what we saw this morning is not here. That is what concerns us in the electronics industry more than anything else. There are major shortages we feel in engineering, but one of the things we are desperately concerned about is the basic education of the general labor force in the United States.

One piece of anecdotal data that exemplifies this, and that is one of the people—Professor Wurzop from the University of Chicago—who is working with us on this manpower program—is currently being talked to as a consultant for the Pentagon.

One of the roles he has been asked to comment on is to reduce the average reading level of training manuals in the armed services from the average eighth grade level to the sixth grade level.

That is occurring at the same time as the sophistication not only of the weapons systems, but the basic testing equipment that we have in our factories.

Mr. **Stark**. I thought that was just to accommodate the generals.

Mr. **Miller**. Those are the purchase catalogs. We are talking about operation at this point. We have gone to cartoons.

You know, you have a three alarm fire going here. If, in fact, again if we see this dramatic shift of where job opportunities are and where job growth is, with all due deference to the President of the United States, the kind of productivity that is almost glib, that we talk about, that somehow we could get Detroit going again, or Youngstown going again, almost seems to me with any kind of indepth investigation an impossibility unless you do this, because the old Youngstown plant and the old Detroit plant or Lansing, can't compete.

So, to talk about making those workers run faster and faster and faster is really almost a mindless approach, it seems to me, in terms of the problems that confront us. That is not the answer. If there is this dramatic shift into what, I guess my father once told me was one person taking in another person's laundry, but it is in fact real, the shift to information, the shift to services; somebody cataloged and said in the seventies the most dramatic growth in new jobs was in McDonald's, the biggest contributor to new jobs in the country.

Even within that industry we find—we found out around the minimum wage we had the labor intensive hamburger and a capital intensive hamburger. That got a fight going on what to do with the minimum wage apparently.

We won't go into that any more.

It seems to me that the kind of problem that we are talking about for students who are now currently enrolled, is significant at least.

Mr. **Petersen**. I am not in the education field. I have listened to these people because basic education will be, in my judgment, the pacing item in technological development, because you can't run, in a technological society, a technology business without the underpinnings.

What happens is, I am told by educators basically if youngsters have not made a basic commitment through their families, through their very early age, they are using a cut-off of 15 years; I think it is much earlier. What we do, the educators are telling us, they effectively eliminate all those youngsters from the technological pool that is available. So it is kind of scary to us in the industry.

A number of these youngsters are not being exposed to science and math at an early stage.

Mr. **Miller**. Do you believe that?

Mr. **Petersen**. Yes, I do.

Mr. **Miller**. I guess we are all guided by our personal experiences.

I can think of a great number of young people whom I know who were exposed to computers in community colleges who are now finding very attractive participation in that job market and their own businesses.

Mr. **Petersen**. I think that is true. You can train technicians. I think the thing we are talking about, if you take a look at basic engineering——

Mr. **Miller**. Excuse me. You are talking about if you don't have the commitment to the basic math and sciences by the time you are 15?

Mr. **Petersen** [continuing]. That is correct, yes. You can train people in specifics, but basically for engineering roles in the future.

I think the point you were getting at, in my judgment, is very true. That is what concerns us. The job opportunities are unlimited in our industry, but we see the base from which we are drawing them from is the lines are getting divergent. That is what concerns us.

Mr. **Miller**. Pete?

Mr. **Stark**. I am concerned that we have politically, more than economically, been unwilling to say sorry, Youngstown—I don't represent Youngstown—but there is no way you are going to make steel profitably on either coast of this country.

Inland Steel understands that. It is very tough for the United Steelworkers to buy into that. We have to make an effort to retrain and relocate them.

The Japanese understood that.

Politically we are unable to do what they did thus far. We will soon have a lot of structural unemployment. We are constantly going to refine the skill levels up and up and up as your industries become more sophisticated.

Do you think you, as businessmen, are willing to assume the economic burden of providing for an ever-increasing group of Americans whom we are just going to have to support?

We may find more humane ways to do that and make their life more interesting, but I see—and I think—what we are really going to do is say, look, we are going to have fewer and fewer and higher and higher skilled people. There isn't going to be much of a market for—and I say this only as illustrative—for the streetsweeper and the window washer.

That is a political problem. Other countries deal with it. Germany sends the guest workers home. They solve unemployment by just removing it.

Japan has a stronger alliance between government and business and actually does some economic planning that we might be branded socialist if we brought it up at this point in our economic development.

Do you think that you, as industrialists, are willing to assume that burden for the citizens of our country who can't get in? We can help provide the training that you need, or don't you accept there will be these people left over?

Mr. **Petersen**. There will be a big pool of unemployed people that have seen the last effective employment. It is not because I don't think business would be unwilling to take them in.

Let me give you a special experience.

As I talked with people—I happen to be in some major labor negotiations right now—I had, from the company's standpoint—I guess this is on the record, but that is OK—expecting an education training demand to come across the other side of the table. I waited and waited. I did not get it.

I proposed the training and education demands for the other side of the table because they didn't know what to ask for.

The technology is changing so rapidly. So the company, the management side of the table, had to propose that.

I think as I said, I talked with some people, and I talked with a lady who said, "Why didn't you propose training?"

I said, "I am going to propose some training. Would you like to get involved in it?"

She said, "Oh, I am 37 years old." She said, "That is all right for my children, but" she said, "I wouldn't want to do it."

I said, "Why not? You are only 37 years old."

She said, "Well, I am just too old to change."

I said,"Do you know that your job may become obsolete?"

She said, "Well, I will just take my chances."

So there are a combination of factors out there working against us.

Mr. **Miller**. That is what keeps people smoking cigarettes.

[Discussion off the record.]

Mr. **Petersen**. So I think yes, there will be continued unemployment.

Will we, as an industry—be willing to pick it up? I think business generally does what they have to do when they get forced into it. As we see more of the lack of preparedness, as people come to us, what we generally do, we absorb that incremental difference by providing training in our own companies.

I see these things as really positive measures, and the other thing that I see is that it is a cooperative venture. That is probably the most significant thing that comes out of here. We happen to be a large user—and I know it may not be popular—of the CETA program. I have seen it work. The thing I have seen work most of all when people get forced into doing something is the cooperative effort between the two sectors.

That is what is going to have to happen. We cannot have two camps as we have had in the past.

Mr. **Stark**. Tension is good; contention just blows it all away.

Mr. **Miller**. We are going to try to get the committee to come to Chicago.

Mr. **Petersen**. Maybe during the spring or summer.

Mr. **Miller**. We could have used your testimony on CETA last year. Let's tell Mr. Hawkins.

Thank you very much. Thank you for coming such a great distance to participate. We will obviously be back to you because if you think the educational institutions need guidance, you should try the Congress.

Next we will hear from Hank Weiss, Executive Vice President of the Industry Education Council of California, Robert Preston, Manager of Technical Training, National Semiconductor and Charles Priest, Director, Contra Costa County Regional Occupation Program.

Your statements will be put in the record in their entirety. You may proceed however you are comfortable. Obviously if you have heard something you think needs to be commented on, it is helpful to have you do that.

Go ahead.

STATEMENT OF HANK WEISS, EXECUTIVE VICE PRESIDENT, INDUSTRY EDUCATION COUNCIL OF CALIFORNIA

Mr. WEISS. Good morning. I am Hank Weiss, Executive Vice President of the Industry Education Council of California.

That is a collaborative business, labor, education, and employment leaders who are concerned about the transition of students from school to work, elementary through community college levels.

We have more than 200 major California companies and about 1,100 regional and local business people, some 600 educators, and 150 agency representatives participating in this collaborative.

You will find in the packet that you have a map on the front of it which indicates where local industry education councils with these various representations are currently affecting some change in the education system and an improvement in the transition of students from the school system to work.

We believe that H.R. 5820 encourages education private sector cooperation. However, we would encourage that that bill strengthen its impact by leveraging its own funds for matching with other resources and not just be a clean bill by itself which tends to support one activity.

Encouraging such a match would stimulate the melding of vocational funds, private sector support that comes in the form of money, personnel, materials, equipment, work sites, and resources from State employment services, State departments of rehabilitation, or education and State and local economic development commissions, the Comprehensive Employment Training Act, private industry councils, and still others such as in California the school improvement program which allocates to schools—elementary through secondary—an opportunity for them to use education funds to invest in their own change process.

H.R. 5820 might provide a bonus factor for programs that garner or match H.R. 5820's own funding if at least two other resources were included in that match. So that the match indeed becomes a real and effective kind of partnership.

In a recent book, "The Poor Man's Futurologist," Alvin Toffler talked about the need for ad-hocracies and the combination of resources to get past institutional malaise and other forms of arteriosclerosis that sometimes permeate institutional change.

I have been an educator for about 32 years. When I started, they said an educational change took 25 years to accomplish. I believe they were wrong. It sometimes seems as though it takes much longer than that. Some of the educational changes that were being advocated 25 years ago are still in some kind of exploratory process and have really not been assimilated.

The education system can respond and will respond best if it responds in a collaborative fashion with strong systematic participation by business and other related agencies, all of whom have some stake in the product that the education system delivers.

We exercise a rather unique role as an infrastructure broker in that we pull together business that has a particular interest in the education process, the educators who have delivery capacities, the agencies who have some related role to those delivery capacities, and anyone else in town, community-based organizations who have something to deliver to a learner mode moving from school to work.

We currently, in fact—with the two gentlemen who are here today and the gentleman who left from Atari—you will find in your packet a description of the program that he gave in which Atari and the industry education council are working together on a computer plan.

We are now forming and have operating a statewide task force of 35 corporations, some leading educators who are able to leap onto a hot idea when they see it, and some agency people.

We are taking a look at high technology careers, in fact careers as they pertain to this bill. That task force organized itself into five subcomponents.

The first is marketing high technology careers to students. I may set up a program that provides facilitation, learning opportunities, teachers, that sort of thing, but if the programs aren't marketed to students as a viable option for their future, the amount of enrollment in these programs is going to be delimited.

So we are interested in marketing technical careers.

We are interested in improving teacher competencies through training, staff development, and through the expansion of such activities as teacher internships, where the teacher is released by the school system and spends full time in the entry level jobs represented by that industry.

We are interested in expanding and upgrading curriculum. We are interested in encouraging direct business support to the instructional process through funds, through personnel, through equipment, materials, work sites, and deeper training. These five components of this task force are already engaged in an analysis of what the best curriculum currently expended in school systems is and how that might be applied as a model.

The best curriculum at this point would lead to this kind of performance, and the ultimate curriculum would lead to this kind of performance, how do you fill the gap between those best models using existing education resources, and the optimum models which may require a coalition of resources from still other forms?

We find out what the best education investment can provide; we take a look at the optimum program and identify the gap. We figure industry and agencies, and bills such as H.R. 5820, have an opportunity to fill this gap to provide the optimum.

Actually H.R. 5820, in our perspective, is a teaser. It doesn't provide a heck of a lot of money, but it does tease out some attention to the task. By itself, unless it is employed as a leverage tool, it will only tease. some fundamental things have to occur. There has been some discussion here today of a need to impact not only the vocational technical programs, but to take a look at basic skills in science and math. Those basic skills in science and math are generated at the elementary, middle school, and high school levels.

Unless those basic skills are attended, again the matriculation to the kinds of careers we are talking about will not occur because the basic skills will not have been assimilated.

That means there has to be some significant attention by somebody's bill or by somebody's education system to the fact that math and science and other related skills, which are basic to maturation in those fields, have to become the purview and as much of a focus in priority of elementary and secondary education as the programs themselves which students are supposed to be led to.

We think that one way to stimulate education change is through this collaborative process. If you leave institutions to themselves with segregated funding, they tend to use the segregated funding myopiocally. Somehow some kind of interinstitutional brokerage arrangement has to be generated that pulls the best from each of these institutions and applies them to the task.

The Congress is familiar with the ability of institutions to assimilate funds and use those funds for the survival of the institution.

In this case I hope these funds are used primarily for the pursuit of client interests. In this kind of program there are three clients. One client is the learner, who has to make some progress to whatever options are out there.

In this case high technology options.

The other client is the employer, and the third client is the national economy and national security. That is a collaboration of clients in itself, but somehow that configuration ought to be drawn into the implementation of legislation such as this.

We certainly support H.R. 5573 and this Atari van which you have before you is an example of what can be done.

We hope there will be 12, 13, 14, 15 of these vans circulating in California.

Thank you.

[The prepared statement of Hank Weiss follows:]

PREPARED STATEMENT OF HANK WEISS, EXECUTIVE VICE PRESIDENT, INDUSTRY EDUCATION COUNCIL OF CALIFORNIA

The Industry Education Council of California (IECC) is a collaborative of business, labor, education and employment related agency leaders concerned with the transition of students from school to work (elementary through community college levels).

IECC involves more than 200 major California companies and additional 1,100 regional and local businesses, some 600 educators, and 150 agency representatives.

IECC, a private sector initiative, identifies education-to-work concerns, collates private and public sector resources, and improves education efforts to produce employable personnel. IECC operates programs from Sacramento to San Diego through a network of 26 local community councils.

The IECC thrust produces two products: (1) Better educated/trained employables, delivered through an improved education system; (2) An ongoing collaborative of business, education and agency resources which can expand its focus to a variety of education-to-work issues.

THE NEED FOR A COOPERATIVE APPROACH

H.R. 5820 encourages education/private sector cooperation. The Bill could strengthen its impact if it also leveraged its own funds for matching with other resources.

Encouraging such a match would stimulate the melding of vocational funds, private sector support (money, personnel, materials, equipment, worksites), and resources from State Employment Services, State Departments of Rehabilitation or Education, and State and local Economic Development Commissions, the Comprehensive Employment Training Act and Private Industry Councils, and still others.

H.R. 5820 might provide a bonus factor for programs that garner or match resources with at least two other support sources.

PROVIDING AN INTRASTRUCTURE FOR EFFECTING COOPERATION

Multi-resource education/training efforts are not generated spontaneously or in a vacuum. Institutional boundaries and territory complexes defy cooperation. Someone, or something, has to serve as a broker to put it together. An intrastructure to effect cooperation is required.

IECC has had nine years experience melding resources and building multi-support mechanisms for more effective education results.

A network of Industry Education Councils exists in California. Umbrella groups that confederate similar resources are being formed around the country.

Support for brokering activities, such as Industry Education Councils, should be provided in the Bill as demonstration funding: How to enlist all of the resources (Federal, State, local, public, private, community based) to the task of stimulating math/science/computer tech education.

HOW AN INTRASTRUCTURE "BROKER" WORKS

As one of its sixteen programs combining multi-resources, the IECC has already developed business/education/agency task forces to secure improvements in math/science/computer tech. The effort starts with elementary education and a program called "Computer Literacy," a mobile van which circulates to elementary schools. A proposal to expand the number of vans has been developed. The van itself is a product of collaboration between companies and the education system. Atari Corporation was the primary participant.

The longterm resolution for bringing required human resources to national math/science/computer needs starts with elementary students and development of their interest and math/science competencies. Continuum experiences are required at the middle, high school and community college levels. Unless a base of interest and skill is established in the lower grades, no one will matriculate through incrementally developed learning experiences to jobs or career placement.

The IECC business, educator, agency math/science/computer task force is working on five related components—components which eventually have to be reflected in the implementation of H.R. 5820. The components focus on marketing high tech careers to students through teachers and counselors and direct student contact with job and career options; improving teacher competencies through training; expanding and upgrading curriculum; encouraging direct business assistance (funds, personnel, equipment, materials, worksites, teacher internships). This program, too, starts at the elementary level and works on to middle, high school, and community college.

The IECC is culling the interests of all parties and extracting performance and commitment from business, education, and agencies. These interests are broken into prescriptive objectives, defined tasks, and the best application of resources from each of the participating elements (business, education, agencies).

Congressman Miller has participated in a similar collaborative in his own district which successfully educates and places disabled youth into the workforce. That IECC program "The Cross Agency Project for the Education, Training and Placement of the Handicapped (CAP)" utilizes the same "brokering" approach and provides an intrastructure and process for melding resources.

H.R. 5573—IMPROVING TAX INCENTIVES FOR BUSINESS PARTICIPATION

The education/training costs inherent in high tech career human resource development can never be successfully addressed by education alone. Nor should it be. Incentives to enlist employer participation and support are imperative. Both students and employers, and the economy as well, as served through such incentives as H.R. 5573.

SUMMARY

1. IECC endorses H.R. 5820 and H.R. 5573.
2. H.R. 5820 should encourage a match with other resources to more effectively leverage involvement of all potential participants.
3. H.R. 5820 should provide some funds for model collaborative intrastructures which can collate diverse "players," and resources for a more prescriptive attention to education/training tasks.

[From the Industry Education Council of California, Burlingame, Calif., March 1982]

MOVING COMPUTERS INTO CLASSROOMS—A PROPOSAL TO PROVIDE HANDS-ON COMPUTER AWARENESS FOR STUDENTS AND EDUCATORS IN CALIFORNIA

INTRODUCTION

Computer literacy is fast becoming a skill as basic to productive living and working as reading, writing, and computational skills. It is clear computer technology is already impacting the everyday lives of consumers, employers, employees, and educators.

All trends and projections point out that computer technology will play an increasingly large role in virtually every arena of American life during the balance of this century and beyond.

The challenge to the educational community is clear: schools need to respond quickly, with trained personnel, appropriate software, hardware, and curriculum infusion strategies to provide this new basic skill to students. Schools (and educators) must re-tool to include computer literacy.

This poses a major problem. Traditional resources available to the schools are inadequate and continue to dwindle. Other resources are needed to introduce computer literacy in the time demanded.

This proposal addresses a proven model to introduce computer literacy to schools in a cost-effective manner. The model features private sector collaboration. Atari, Chevron, Pacific Telephone (A.T.& T.) cooperatively provide the van with heavy educator participation.

THE PROPOSAL

Our proposal is to replicate the successful Computer Van program which is currently operative through the Industry Education Council of Santa Clara County.

The present program's success reflects an investment of approximately $150,000, predominantly of private sector origin, and a full year of operation. During this school year, the Van program is delivering computer literacy experiences to over 8,000 students enrolled in 275 classes, in 76 separate schools. The program will provide instruction in 17 different school districts, serving mostly students in grades 3 through 9, where computer literacy needs to begin. At the same time, the Van program will provide inservice computer literacy experiences to 35 school faculties plus over 25 special programs at weekend workshops, conventions, etc. Also, the Van has been a significant resource to Community College classes and negotiations are underway to set up summer courses for youth through city recreation departments.

The Computer Van was fully scheduled for the current school year by the end of February and it is now fiscally self-supporting on the basis of modest fees charged to users.

The Santa Clara project works. The Industry Education Council of California (I.E.C.C.) is prepared to develop additional Computer Van programs in locations where regional I.E.C.'s can insure continuing private sector investment to reinforce the programs.

STATEMENT OF ROBERT PRESTON, MANAGER, TECHNICAL TRAINING, NATIONAL SEMICONDUCTOR

Mr. PRESTON. I am Bob Preston. I would like to start out by telling you a little about some of the things that have been said already.

I would like to see some consideration of the whole package here; that is the basic educational structure, the computer literacy that was spoken of by Mr. Jobs, as well as the vocational structure that you are putting into place. I see the bill, H.R. 5820, as being a very big plus to the vocational educators throughout the country, specifically in California. As a past teacher myself, in a technological area, one of the main things I was constantly faced with was a shortage of up-to-date equipment, textbooks, supplies, and keeping myself current with what was going on in the industry.

I found upon leaving education and getting into industry I lacked a good deal of knowledge about what was current in industry as it stands today.

I think I would like to see us not talk in terms of just plain computer literacy, but in terms overall of technological literacy.

We are not dealing with just putting computers into schools, because that is only part of the picture. A computer is a tool. It should be conceived as such and used as such. The person that is still in the classroom doing the majority of the work is the instructor. He has to bring it all together for the student.

So I look at the whole picture as being upgrading the technological challenge we have in the country.

At National Semiconductor, we are currently spending—approaching $5 million per year just to upgrade our internal employees. We are willing to spend a great deal of money to upgrade, to continue to push the development of new products and so forth, but what we find in these upgrade programs is we are having to retrain people who are supposedly trained by the community colleges, some of the high schools, some of the private vocational schools simply because they are not current; they are not up to date; they do not have the kinds of equipment in the classrooms that is needed to actually come out on the job and work on a job without that additional retraining.

It is an expense for the companies; but like I say, the companies have been willing to do it because they have had no choice up to this point.

The semiconductor industry, for example, is one of the major industries or companies that have given impetus to this whole rise of new technologies, the satellites, the telecommunications industry, the video industry, the computer industry, and so forth.

It has really come about to a great extent based upon the development and integration of the integrated circuit.

The machinery we are using to produce those integrated circuits has gone through several generations of change in just a period of the past 12 years. I have seen it go from almost entirely mechanical to electromechanical to electronic and now we are talking in terms of intelligent machinery. That is a whole other area that really ties a computer with the electronic world.

It is that world that is mind boggling, baffling to the individual working in those areas, and it is that area we need to address.

An understanding of the machinery and the processes of industry are really predicated upon the basics that we give to the students. In teaching classes myself in industry, one of the big problems I do have is simply trying to put across a concept, the basics of that concept the student does not know. In other words, I can't teach the concept until I teach the basics. I prefer not to have to go back and teach those basics. I would like to see that done in the schools.

In general, I have laid out my recommendations for what would be some of the types of things that this type of funding could do for the schools. In specific, I think the media materials and machinery aspects are perhaps the most important. Equipment, upgrading oscilloscopes, bringing more of the current types of instrumentation and equipment into the classroom is going to increase the awareness of the students to the point at least where they somewhat understand and can relate to what they are going to see in industry.

There is a dramatic transition that takes place in most of the electronics classrooms as a student moves out into industry.

I hate to place the blame totally on public education. I have seen many good things happening in public education. There are a tremendous amount of excellent programs out there. We at National Semiconductor hire students straight out of high school if they have had a certain number of years of electronics training at specific high schools. That is based upon the ability of those high schools to do a thorough job of training in the basics of those concepts.

So the schools are getting a lot of the blame. I think we have to look at declining enrollments and proposition 13 for some of the facts we have lost funding and so forth for the schools.

The electronics instructors in the State of California are very much interseted in upgrading. They carry out meetings and conferences on a regular basis specifically to do that, to help each other share materials, to help each other learn more about what is current in industry, but they are finding that they are more and more strapped with the lack of funds and more and more strapped with just general apathy.

The public is getting tired of the job that the school districts are doing, and so forth.

The teachers, I think, are feeling frustration from that.

Industry, I think, is very willing to get involved. I have seen quite a few efforts and support coming out of industry. I believe very strongly in the support bill, the H.R. 5573, which is the donation. As a high school teacher, I received many donations from other companies in the Santa Clara area and the companies were just generally giving this without a whole heck of a lot of tax incentive to do that.

I think they were looking to upgrade what was going on in the high schools. I was very appreciative of that. Most teachers are. I think with this bill, it gives the companies some backing to do that and to be more—more companies will look at donating equipment if that bill passes.

Thank you.

[The prepared statement of Robert Preston follows:]

Prepared Statement of Robert Preston, Manager, Technical Training, National Semiconductor, Santa Clara, Calif.

While most older, established industries have experienced considerable economic decline in the past decade, the electronics/computer industry has undergone phenomenal growth. Most of this growth can be attributed to advances in the manufacturing of integrated circuits. Applications of these devices are rapidly changing the way we work and live. Consumer electronic products, commercial electronic systems and industrial manufacturing machines are becoming the most complex accomplishments of American industry.

In the electronic manufacturing sector our greatest resource continues to be our employees. Technical expertise is rewarded with high salaries and rapid promotions. Engineering and computer science professionals have little difficulty finding entry-level employment with salaries in excess of $20,000 per year due to high demand for a low supply. At the semi-professional and vocational levels, this situation is repeated for computer and electronic technicians. Efforts are underway to support more and better engineering education. Much remains to be done at the vocational level.

Two-year graduates in the areas of electronic test, maintenance and service are in very short supply. Competition among companies for this limited pool is often fierce. Many graduates lack exposure to and experiences in dealing with state-of-the-art circuitry and instrumentation. Several larger companies have been forced to initiate inside classes in fundamental and advanced electronic technologies in order to upgrade employees and retrain new-hires from vocational schools. New-hires often lack the breadth of knowledge required for effective troubleshooting skills and logical thought. All too often vocational curricula excludes important areas of electronics technology in addition to support and peripheral technologies and academic subjects.

The ideal electronics technician has: sound mathematical skills; possesses an understanding of basic physics; is a mechanic; has experiences in drafting and machine tool practices; has a working knowledge of computer and materials sciences; and has completed a rigorous course of study in electronics technology encompassing theory and concepts of devices, circuits and systems.

Blaming our schools for improperly training technicians only compounds the problem by frustrating instructors who have worked hard to provide a quality education with continually dwindling resources. Instructors are faced with keeping pace with technologies which are in constant flux.

The exploratory electronics course once offered in our junior high schools is virtually extinct. Declining enrollments and Proposition 13 have teamed to close high schools and/or their 2-3 year curricula. The costs of state-of-the-art training equipment and instruments are well beyond reach of most electronic program budgets.

No single solution will reverse the trends outlined above. The course of action must be multi-faceted and include:

1. Up-grade math/science curricula in grades K-12.
2. Reinstate the exploratory electronics course grades K-12.
3. Promote enrollments in electronics courses at the high school level for males and females.
4. Provide teacher in-service funds for: a. workshops; b. industrial field trips; and c. directed studies.
5. Provide funding for purchase of: a. current textbooks and lab manuals; b. laboratory components and supplies; c. laboratory instrumentation; d. electronic curriculum development; e. machine and hand tools; and f. microcomputers and software.
6. Offer courses in technical writing and illustration at the high school level.
7. Integrate high school mathematics and science courses with technical curricula.
8. Restructure teacher pay scales to lure college students into science and technical teaching areas.
9. Push for more industry involvement manifest in: a. donations of money and equipment to public schools; b. loaning industry professionals to school districts for curriculum development and guest instruction; and c. provide technical summer jobs for teachers.

The funding provided by H.R. 5820 would help implement some of the solutions presented here. I urge your support of this bill.

STATEMENT OF CHARLES PRIEST, DIRECTOR, CONTRA COSTA COUNTY REGIONAL OCCUPATION PROGRAM

Mr. PRIEST. I would like to fill in some gaps and maybe reiterate a few items instead of moving into a 10-page dissertation.

First of all, for clarification on the regional occupational programs, there are approximately 68 in California. Some of these are county operations, some are joint powers, meaning two or more districts get together.

In Alameda County we have about four or five regional occupational programs or centers. In Contra Costa County it is run out of the county organization. There is one regional occupational program.

In Contra Costa County we serve over 5,000 residents per year, from 16 to 60. Some programs are located in high schools, some are at community locations, leased facilities, some are in businesses.

There are approximately 200 businesses that help us with training from the county and we are well tied into the business.

As far as the computer field goes, out of our 104 classes, six of them are in computer training. I have grandiose plans for seven more by next September. One of them we have all set up at Clayton Valley High School. There are 60 students ready to get into a class that can take from 20 to 25.

What we are going to do is try to send out quotes and see if we can get it on this year's budget to buy some computerized equipment.

Last year we set up two classes at this time. The cost was over $100,000 just for the equipment. We figure about 12 or 13 computers for each class of 25 students.

As far as—you need to be careful both—one computer going to each school.

You talked about the 16-millimeter projectors in the closet. If we have one computer, that means we have to put it in a closet so it is central to everybody, to come get at any time. Some way if there is one computer, it needs to be accessible to everyone.

Anyway, we are trying to move into this field of computers as fast as we can. The need is there. Not only from the student need, the elementary schools seem to be a little bit better off in our country in providing the computers through the parent. They have gifted programs. I am going to the high schools, with these gifted programs; maybe they have five computers; they say, let me buy seven more, 2 hours of the day on those computers.

You operate your classes around those with my computers and your computers.

That seems to work out fine.

As far as the moneys being a carrot, we are used to an education working on a consortium basis. We work with Hank Weiss and the industrial education council; we work with all of the public agencies; we work with over 200 businesses.

I would like to talk about the 25 percent contribution from industry. A growing business is generally taking money and pumping it back into the business in order to grow. That is why I made the suggestion maybe in the first year there will be a sliding scale, 10, 15, 20, 25 percent, over a 3- or 4-year period instead of 25 years.

I think we must be sure and include inkind contributions as well as direct contributions with this in there.

I figure there is probably $300,000 worth of in kind contributions to the regional occupational program in Contra Costa County and another $300,000 of direct contributions, but yet this only adds up to about 10 to 15 percent of the total budget that we operate there.

I would like to reiterate the staff development capital outlay. Some way we have to retrain the teachers.

We were asking Pat Langlin about the credentialing. We take teachers that have an interest in the computer field. They can go out to the companies and make 40,000 there. We give them 18,000 or 20,000 to work in the schools, even though it is on a 180-day contract.

We will take any teacher that shows the interest, a little bit of background with the computers, and put them out with an organization for a summer if we have to and retrain them and pick them up in the field.

As far as the capital outlay, that is a real problem. Certainly we appreciate any help that we can get in that field.

I would like to invite you, Congressman Stark, to see some of our programs. I know Congressman Miller, you have been to Richmond High School, the career development center there. There are about 30 vocational programs, two of them belong to the district and 28 belong to the ROP. You would never know it because they are all integrated into the school right here.

But it is a real center, a true center.

[The prepared statement of Charles Priest follows:]

PREPARED STATEMENT OF CHARLES A. PRIEST, DIRECTOR, REGIONAL OCCUPATIONAL PROGRAM, PLEASANT HILL, CALIF.

I must commend the House of Representatives for their interest and commitment to augmenting our training programs in the field of electronic and computer technician vocation education programs.

It is true that the electronic and computer industries are growing in Contra Costa County. The latest survey from our County Schools office showed that there are over thirty (30) electronic manufacturing industries in Contra Costa County. Many of these are small businesses, but a few of them, such as Plantronics Zehntel and Systron Donner, represent the large businesses as we hear about in Silicone Valley.

The need for augmented technical training in Contra Costa County is, however, not only to train students for computer manufacturing companies, but for the companies which use the computers in everyday operations. Example: Bank of America and Chevron U. S. A. recently announced that their computer divisions were relocating to Contra Costa County. It is commonplace to walk through many of the new companies which have located in our county within the last three to five years and observe computers on employee's desks. In addition, each company will have one or more computer centers.

Another example of this intensive use of computers is the Safeway Accounting Headquarters in Walnut Creek. At that location the Regional Occupational Program offers a computer accounting course where the students receive training in a classroom and receive advanced training within departments of Safeway as well as in businesses surrounding the Safeway Accounting Center. This class clearly demonstrates the need for our training programs to be allied closely with the business community if we are to keep pace with the rapid technological advances.

The Contra Costa Regional Occupational Program serves approximately 5,000 residents this year from the ages of 16 to 65. Over 200 businesses open their doors to provide advanced, realistic training on state-of-the-art equipment. Among them are: Contra Costa Times, Safeway Stores, Chevron U.S.A., Reynolds and Reynolds, Dow Chemical, hospitals, attorneys, retail establishments and the backbone of our economy, many small businesses.

There is truly a strong partnership between the Regional Occupational Program and private industry in our county. It needs to be augmented, especially for the smaller businesses, with incentives to industry in order to encourage them to participate further with their "state-of-the-art" equipment. Many of these small businesses in the computer and electronic manufacturers and users area would participate if an incentive was granted. They lack the manpower and facility such as a Chevron or Safeway. As we are all aware, approximately 80 percent of all employed persons work for small businesses. Incentives would definitely be the carrot for them to develop consortiums for electronic and computer training.

A partnership between the schools and business is truly a marketing strategy. Most businesses have not been accustomed to working with schools. The ROP's in the state of California have developed that marketing strategy through the contact with Chief Executive Officers. Most businesses are unaware of the concrete benefits for their organization of the "working partnership." A few of them are: A pool of well-trained entry-level employees; employees familiar with the work environment; minimum paid orientation where employed; employees trained on state-of-the-art equipment; immediate productivity; continual evaluation of employees by employer; affirmative action; positive public relations for company; and worker's compensation is provided during training period.

As you can see, we are able to clearly show business the benefits of having training programs on site—the main benefit being for a pool of well trained prospective employees from which to hire.

The state supported ROC/P's have proven and demonstrated their ability to develop linkages with private industry. It seems to me that the Incentive Grants Act should have the flexibility to grant educational institutions with proven track records of industry-education cooperation to develop the high technology vocational training. In California at the present time, ROC/P's do not receive VEA revenue. This must be changed to allow the prime vocational delivery system to accomplish an even better job.

Again, I thank you for your commitment in assisting vocational education and the private sector work together. We must make sure that the paper work for business is at a minimum; that we have adequate resources in order to offer them a true partnership, and that we use broad-based advisory boards to continually assure that the job relatedness of our programs are on target with the expanding and innovative private sector.

One more item I would like to discuss. For many emerging businesses which are struggling to train new employees, 25 percent contribution may be high. With our overwhelming business and industry participation in Contra Costa County, I figure that only 10-15 percent of the budget is direct or in-kind revenue from businesses. Perhaps a sliding scale—10 percent the first year, 15 percent the second year, 20 percent the third year and 25 percent thereafter would be more in line with their abilities.

Mr. MILLER. Hank touched upon the problem and Congressman Stark touched on it with previous witnesses. If you read the literature, there are some pretty acidic comments passed back and forth between the industry and the educational institutions about who is competent and who is not, why people are in it, why they are not, and their interest.

In terms of trying to pool together that cooperative effort and to accelerate the rate at which it happens, are we better off looking at a regionally coordinated effort? We are not writing a bill here for California. We hope to be the beneficiaries of it, but we have this set up. We had testimony in the committee—when, Jack, last week, the week before—on Pennsylvania, their skill centers. I am not sure even there they were statewide. They were very heavily in the Pittsburgh area, but similar to what we have.

The question is, is it—do you get more leverage if you do it on a regional basis than to believe that every school district is going to come up with the proposal that in fact makes sense?

I am not really interested in—when I first came to Congress, we required everybody to be innovative. Innovative also became very wasteful. How do we achieve that squeezing, to get them to work together? Would it be better to talk about—what do you have—I am thinking of my chairman here too.

You have regional vocational—what do we call them?

Mr. JENNINGS. They are called area schools. Every State is very different. They have this type of program in California, but you can go to a neighboring State and there will be an entirely different program. Or they will work through the community schools instead of the high schools. Or they have technical institutes like they do in South Carolina.

Mr. MILLER. This is Mr. Jennings, Counsel for the Elementary and Secondary Subcommittee.

Mr. JENNINGS. There are a great variety of structures.

Mr. MILLER. I don't know if the structure is there in every State to allow that kind of effort. In some ways it seems to make perhaps a little bit more sense.

Mr. PRIEST. I don't think it makes a difference whether you regionalize or go to the district. It depends upon the people in the districts, the innovators that can run with whatever is given to them in dollars for computers and for teacher education.

Mr. **Weiss**. I think the action ought to occur at whatever level it is most functional. If you take into consideration——

Mr. **Miller**. That is what I am trying to determine. I agree.

Mr. **Weiss** [continuing]. In some communities it ought to be done at the community level. In others you may need some regional stimulus to make it happen.

Charles represents a regional stimulus actually because he covers a whole county, which would be a region. There are something like 33 school districts in his county.

Let's look at it from the perspective of employers. Suppose you are a large employer and you have plants all over—as some employers do—all over the State of California. You want some of this computer high technology capacity. Do you deal with the 1,014 school systems in California?

Do you deal with the 58 counties? Who do you deal with?

In a company that stretches from Oregon to San Diego—take the Bank of America, 1,000 branches—they have high technology computer kinds of interests too. We have been talking about another function of the industry, but they utilize a lot of that type of function. Does each branch manager get involved in setting up a special—building a wheel, or can you build a wheel for those kinds of companies at a State level replicated at a regional level?

The point of implementation is where the teachers and kids are. Implement it at the school level. There are a variety of prescriptions that can be applied to this. For some corporations which are large and made thread not only through a State, but on a regional or national basis, they prefer not to have multiplicity of contacts trying to generate an idea or a cooperation, but rather to do it in a more systematic fashion.

It just isn't a problem with education. It is also a problem with performing some kind of instructional response from business.

Mr. **Miller**. It is not an idle question. We are talking about spending money in the Congress. We now like to have a reasonable certainty in this atmosphere there will be a benefit, that in fact it can be implemented and we realize a benefit from the expenditure of that money. That is why I am concerned as to the model. I don't pretend this piece of legislation is the last word on this subject at all. I am very concerned about that model that is constructed to see that—I really view what Pete is doing, that these are compatible.

In the sense if they were both in place, how would we get the greatest efficiency from that effort?

Mr. **Weiss**. There may not be a model. There may be two or three models. If there are two or three models——

Mr. **Miller**. We would be lucky.

Mr. **Weiss** [continuing]. Yes. If you could identify a number of workable models, where we didn't have a thousand models, I think you could have a regional model, a State model, a community model; all of those models ought to be encouraged as some kind of demonstration on ways to go.

Mr. **Priest**. I view this as not applicable to ROP's at this point because our State does not give the EA moneys to ROP's. However, if this came through because ROP's delivery——

Mr. **Miller**. They certainly say nice things about you. They don't give you any money, right?

Mr. **Priest** [continuing]. The Federal commitment has been to the districts. They always felt the ROP's had enough money through the State. That is fine.

I felt we would change the law at the State level, so ROP's would receive, if we need to.

Mr. **Miller**. Thank you very much for your time and your contribution here.

Proceed. Again, your written statements, if they have been submitted, will be put in the record in their entirety.

The extent to which you want to summarize or touch upon what you have already heard, again that is the most helpful to us.

Mr. Fisher?

STATEMENT OF GLENN FISHER, COMPUTER SPECIALIST, ALAMEDA COUNTY SUPERINTENDENT OF SCHOOLS OFFICE

Mr. **Fisher**. Thank you for inviting us to be here.

We appreciate the opportunity to talk to this issue. My position in the county is as a computer specialist. I am a research person not just in vocational education or the ROP program. I have a slightly different perspective.

I would like to discard my written statement and give you something new. My secretary at work is a word processor, literally. I have no money for clerical support. It is a fantastic tool. I would like to start with an analogy. There is an old quote, "Those who forget history are condemned to repeat it."

I think what we see happening in education and in the electronic or information industry in America right now bears a strong analogy to what happened in France and England. If I remember the dates right, it was in the early 1500's when Jacquard invented the programable loom. It put all the weavers out of work. The loom did the work for them.

The workers didn't like that. They had no jobs. They burned down the looms and cut them up with axes. He built new ones. Some of them then discovered they could earn much more money by being programers for him than by being laborers.

What happened was he could only take a few programers, whereas before they had employed many laborers. The others then went to the city to find other employment. We are having the same problem here. The electronics technology is making it possible for there to be few programers, as it were—and I use that in a general sense, not talking about those that can speak basic and other arcane languages—and there are many people left over who don't have the training. We are seeing that in a lot of different ways.

I think H.R. 5820 addresses in a limited degree some of that problem in that it provides specific money for training and computer and other high technology fields. It encourages the State to provide support and action by requiring that State money be part of it.

Although in California that is not a problem, it is in other States.

Another very important provision of it is the matching or in-kind grants from industry. In many cases, what is needed is more training and equipment than the actual dollars from the industry. By providing that in your bill, I think it may open substantial contributions from industry.

The next thing is that it provides seed money. Not a whole lot more. Fifty million dollars spread over 50 States is $1 million a State. That ends up to be small money by the time you get down to specific programs.

Startup costs in electronic technology are very high. I estimate it will cost the district roughly $30,000 to provide one classroom with computers to do training for approximately 150 students per year using that for five periods per day of instruction. That is a huge amount of money in districts in an era of declining enrollment and less and less money, but your bill may provide that startup money and thereby enable them to start a program.

The two or three problems I see that it does not address: One is instructor training. While there are many teachers who are interested in the technology, many of them graduated from school 20 or more years ago when it was a whole different subject then. It was vacuum tubes instead of very large-scale integrated chips. They don't have the current knowledge. Business teachers, for example, of such subjects as typing and shorthand are woefully unprepared to teach word processing. It is a whole new ball game.

I do not see specifically that H.R. 5820 addresses that issue.

What I see in my position is the severe shortcoming of it only addressing the question of vocational education, which touches a very small although important part of the students in education.

It does not address elementary education, or secondary education in general.

The problem there is that some of those students already have access to computers, some at home, some in their schools.

As somebody mentioned earlier, elementary schools seem to be moving faster into computer use in the classroom. We are running into a problem in Alameda County that students are getting to the junior high and high school having had computers in their classroom and having experience with their computers, and the high school has no computers because they have no money and no instructors because those instructors have been hired away by business at two or three times the salary.

That is an issue I don't know how your bill can possibly address. There is a brain drain going on in education which may be part of the problem the industry people talked about earlier that a competent teacher can earn far more money in industry than in education.

I was the only student out of 150 in the year I graduated from California with my education credential who had taken any major science background, who even had a minor in science in the elementary credential program.

I happen to have a major in chemistry. It was extremely unusual. They had no chemistry major in the experience of the program there.

I don't know how to address that issue. This bill does not, but it does provide seed money and a start.

I would like to address the issue raised by Congressman Stark's bill, H.R. 5573.

The first thing, the time, it sets a 1-year limit. I strongly disagree with that limit. I hear your arguments if you make it indefinite, people will wait forever.

I feel it should be at least a 2-year limit to allow the schools to do the necessary preparation and training. Dropping a computer into a school is going to guarantee that it sits in the closet, because nobody is going to know what to do with the darned thing.

I have seen that—the most acrimonious training I did was at a school where the principal went out and bought 12 computers and they had gathered enough dust I literally had to dust them off before I could use them for the training.

The computers had been bought before the necessary staff development had been done.

The next thing is H.R. 5573 must be sure to include computer software.

As you saw this morning, the Apple people did a nice demonstration. They did not demonstrate the computer. They demonstrated software that runs on the computer.

You can do very little with the computer itself. You can do incredible things if you have the software to use on that computer.

While it may make Apple happy to be able to give a computer to every classroom, it is useless unless there is software to use on that machine.

The third thing is H.R. 5573 must be written so it does not force one computer per school. It is meaningless to put one computer in a school. It is a PR stunt and nothing else. It cannot have significant impact on a significant number of students.

In fact, what I have been recommending to districts in Alameda County is, if this bill comes to pass, they put those computers in a pool and make the districts bid for them so that they can put a significant number of comptuers in one school and make a significant impact on those students.

That basically concludes the comments I have to make.

[The prepared statement of Glenn Fisher follows:]

Prepared Statement of Glenn Fisher, Computer Specialist, Alameda County Superintendent of Schools Office, Hayward, Calif.

COMPUTER USE IN VOCATIONAL EDUCATION TESTIMONY ON H.R. 5820 AND H.R. 5573

Computers are found in the real world, but not in schools. Vocational Education is training students for the offices and technologies of the 1960s. In the short 5 years since the introduction of the "personal" microcomputer, businesses have adopted them wholesale, because they have found them costeffective. Schools, on the other hand, are moving very slowly to acquire microcomputers. Why this difference?

FINANCIAL DRAIN

Acquiring microcomputers is an enormous financial drain for a district. A school wishing to implement computer-based classes is faced with $24,000 to $40,000 for a lab of 30 computers—one for each student. In this era of declining enrollments and entitlements, the money is not there. Because of the new State Block Grants in Education, money that was there (such as Title I and IVB) has disappeared into the general budget, where inflation gobbles it up. A teacher with a budget of $1,000 per year for replacement, repair, and new equipment has little hope of acquiring a computer. And if he or she does, how does one effectively use one computer with a class of thirty students? Many business teachers have been visited by slick salesmen promoting $6,000 word-processing stations. Whey they leave, the teacher often thinks

". . . or 12 selectric typewriters"—an effective trade for a teacher who still has some manual typewriters in the class.

Industry currently sees little reason to invest in schools because students' skills don't match it's needs. Businesses using high-technology equipment can't find high school or junior college students with the appropriate background to use or service the equipment.

While money never solves a problem, a great deal of the lack of computer use in schools is directly related to money. Computers are expensive! Interest on the part of teachers far exceeds the ability of districts to provide. Teachers who are ready to teach classes of thirty have equipment for 3 to 5 students! This proposed infusion of targeted Federal money would encourage States and districts to spend the required money to start appropriate programs.

TEACHER TRAINING

The second part of the problem as I see it, relates to teacher training. As one typing teacher expressed it, "My students need to know word processing to find jobs. I'd like to try it. But how do I learn so I can teach my students?" There is currently an almost total lack of training in computer use for teachers; and there is little in the way of educational materials. I know of only one textbook for teaching word processing to students, yet how many typing texts are there?

The problem of training is exacerbated by the circumstance in many districts that most teachers are already at the top of the salary schedule and have no incentive to spend their own time and money to learn to teach a new class, for which they will probably have to develop most of the materials themselves. It is a credit to teachers that they flock in incredible numbers to workshops and classes on computer use! This problem is worse in technical subjects (such as electronics) where many teachers have been out of contact with the profession for over 20 years. They graduated in an era of vacuum tubes, and their students are graduating to VLSI (very large scale integrated) chips.

The 25 percent industry matching provision of the bill may inspire districts and industry to cooperate in bridging the gap in training and money.

PROVIDES INCENTIVE

In conclusion, H.R. 5820 provides seed money and incentive for districts and states to work together with industry in updating their vocational education in computer and other technical fields.

H.R. 5377 provides the reverse of the coin: a financial incentive for industry to donate some of the expensive technical equipment needed by schools to upgrade their programs. Most of the cost of a computer lab is the initial acquisition; operating costs are not a burden on a school or district. The 1-year provision of H.R. 5377 is not a substantial problem, since it allows industry to donate much of the initial equipment inventory to schools, minimizing start-up costs. The one-year limitation will only be a problem for those (many!) districts not ready to act when it is passed.

LOCAL SITUATION

In Alameda County, there is currently one Regional Occupational Program (R.O.P.) which has 25 computers and teaches programming all day long. A second R.O.P. has been unable to fund computer acquisition, and a third has just one computer.

While virtually all of the 19 districts in Alameda County have Vocational Education programs, only 8 high schools in 8 districts had computers in their Vocational Education program last spring. Of those, the mode is 1 and only 2 have more than 10 computers.

The barriers, again and again, are money to provide computers for those teachers who are interested and ready to do something, and training for those teachers who are interested but not yet knowledgable. Two large districts have set aside under $50,000 for computer acquisition for next year for all schools in the district; it amounts to about 3 computers per school. Both H.R. 5820 and H.R. 5573 have the potential for making a substantial contribution to the numbers of computers in schools and available to Vocational Education programs.

STATEMENT OF ARMANDO PICCIOTTO, COMPUTER SCIENCE TEACHER AND DISTRICT COMPUTER COORDINATOR, RICHMOND UNIFIED SCHOOL DISTRICT

Mr. PICCIOTTO. I am Armando Picciotto. I am a teacher and also a part-time computer science coordinator for the Richmond Unified School District.

I will summarize what I have written here.

It seems obvious to everyone already that computer literacy is going to be very important within the next decade. If you don't know how to compute, it is going to be almost as bad as not knowing how to read or write, especially out in the job marketplace.

Universities seem to be very well aware of the problem. There are a few of them on the east coast that have made it a requirement for graduation now for all majors, humanity majors included, to take a year of computer science.

Some of them are already talking about making it a requirement for entrance to the university or to the college.

My concern is what is going to happen to the ones who do not go to a college which is really what you are addressing, because the technician, the vocational student usually will not go to a 4-year institution.

What I am trying to say, in essense, is how is that student going to know whether computers is the career he wants to follow, technician is the career he wants to follow, if he has had no exposure to it?

It is not like something—like somebody says all of a sudden, boy, I would really like to get into that field because it sounds good. You have to be good at it; you have to have some training in it before you can make a decision.

That can only happen if you are exposed to it, and you have to get exposed at the high school level. I am here to support the bill because I will support any bill that will put equipment in the schools. That is the primary reason that the students are not getting exposed to the technology.

Frankly, to tell you the truth, anything that will help, I will take. Things are so bad that——

Mr. MILLER. Put him down in the "for" column.

Mr. PICCIOTTO. You know, it has come down to that. There is a certain amount of competition in the schools now for the funds, and one of the things that I fear the most is that there is no question that the most affluent schools are the ones that are getting the machines.

This is especially true at the elementary level, but is also happening at the high school level.

The dad's clubs are getting together, the PTA's are getting together. They are purchasing computers. That usually happens in the more affluent neighborhoods. Those are also the kids that are going to be going on to college and are going to be learning more about computers there. Usually the students might even have a computer at home. So it seems to me that the gap between the haves and the have-nots will even grow more unless some money comes so that the district could spread out the computer wealth to all the schools.

I am afraid that you are going to have a huge gap between the computer literate and the computer illiterate. That gap is going to obviously spill over into the ones that can't get jobs and the ones that can get jobs.

I would also like to say something about the salaries that are involved here at the secondary level. I have students now that are graduating from college, after 4 years of college, that have actual hard job offers for more money than I am making after teaching 15 years. It seems to me it is a little ridiculous to expect them to take a teaching position when, within a few years they might be earning at least twice as much, if not more.

So what is the point of putting equipment in the schools if you don't have the personnel that can use it? They may very well sit in closets. So, unless something is done also in that respect, I think the problems are going to continue.

I would like to say one other thing that deals with the vocational bill I suppose. I have an academic degree. I am the only one in my district that is really working with computers and teaching computer science per se, and I would say that more students came out of my school that are working out there in the field than in any of the other schools in the district.

That is only because they were exposed at my school to the equipment. I do not qualify for vocational funds because of my academic degree. I also only have about a year and a half of experience with industry. I have been told I would require 2 years.

I worked 1 year in Silicon Valley at Fairchild and did some consulting also, but that apparently is not enough.

What is ironic is that most of the technicians coming out of our districts have been trained at my school and by me. I am also in charge of training the teachers at my schools who will qualify for vocational funds because they have the right degree and the right expertise.

So perhaps something should be done about those regulations.

Thank you.

[The prepared statement of Armando Picciotto follows:]

PREPARED STATEMENT OF ARMANDO PICCIOTTO, COMPUTER SCIENCE TEACHER AND DISTRICT COMPUTER COORDINATOR, RICHMOND UNIFIED SCHOOL DISTRICT

The University of California at Berkeley this fall turned away more than 1,000 students who wanted the most basic type of computer instruction, and it expects to do the same indefinitely as the university finds itself unable to cope with the demand. The phenomenon is nationwide. The number of students taking computer science courses in the last five years at Columbia University has doubled, reaching 4,000 this past year. At Berkeley, the academic senate's committee on computing said in a report released in February, 1982, that "the 1980's should be the period in which transition to universal computer literacy for undergraduates is completed * * *" Harvard and Yale require a course in computer literacy for all its undergraduates. George Maslach, vice chancellor for research and former dean of engineering at U.C. Berkeley recently stated in an interview in the San Francisco Chronicle that "computer science education now ranks with simple arithmetic, or literacy in the English language." Most of the experts who are closely following this "computer revolution" agree with Dr. Maslach's statement, which in essence states that in the near future, knowing how to use and work with a computer will be as necessary as being able to read, write, and perform simple arithmetic. The illiterate of the 1990's may very well be the one who does not know how to "compute", and apparently our colleges and universities have become well aware of this problem and are attempting to solve it.

But there are two areas where the universities will not succeed, and it will not be because of the lack of expertise or money. First of all, the thousands of young people who do not attend college at all after finishing high school will surely be handicapped in the job marketplace due to their lack of computer experience. And second, with the expected proliferation of computer equipment, the need for technical personnel to service it, at all levels of competence, will become even more severe than it is now, and career paths are often chosen at the high school level.

The primary reason that secondary schools have not provided, and will not provide in the near future, their students with computer experience is the lack of funds to purchase necessary equipment. A nationwide study of school districts done by Dr. R. Stutzman from California State University at Fresno reads in part: "The lack of financial resources is the primary inhibitor to the implementation of computer instruction * * * Until meaningful financial assistance is available to school districts, computer instruction programs will not be implemented * * * [those that will be], in the absence of district funding, will be more likely in the form of discrete localized efforts than in general district-wide commitments." And I fear that these "discrete localized efforts" will take place in schools located in affluent neighborhoods. For it is there that parent involvement in schools is high and computers are being purchased by PTA's, Dad's Clubs, etc. * * * and parental pressure and action can do wonders for a school's curriculum. It is also there that the greatest number of "gifted students" are found and large amounts of the state's gifted funds have been spent and are being spent on computer equipment. These are also the students that will most likely be going on to college where they will receive additional computer instruction, thus widening the gap between themselves and their more disadvantaged peers even more. It is imperative that computer literacy classes become available to every high school student in the country. This can only happen if moneys and/or equipment is distributed on a district-wide basis rather than relying on special funds or sources. It is for this very reason that the Technology Education Act of 1982, which encourages industry to provide secondary schools with computer equipment, is a step in the right direction.

The shortage of technical personnel in the electronics-computer industry has been well documented elsewhere. I saw it first hand last year while working at Fairchild in San Jose during a leave of absence from my teaching duties. I was amazed at the number of skilled and semi-skilled technicians that the company had imported from Singapore, the Philippines, Hong Kong and even Europe because they could not find enough qualified people locally. It is also general knowledge that this shortage will most likely get worse rather than better in the near future. I would like to stress that many career decisions are made at the high school level, and if students have not had the opportunity to work with computers to find out for themselves if they like it and/or are good at it, then it is not reasonable to expect them to consider making a career out of it. I have now been working with computers at the high school level for approximately eight years, and the number of students from our school that are now working with computers at all levels (service tech at Computerland, Northstar Computers, Corvus, IBM, etc.* * *) is far greater than our school population justifies. This is only because our students were exposed to computers early and given a chance to work with them. Many of these students were not of college caliber, and in some cases they barely made it out of high school. Some were cutting classes right and left except for their computer class, which they thoroughly enjoyed. You don't have to be an academician to be a good computer programmer. Any program that will encourage vocational funds to be used for the hands-on training of computer personnel at the secondary level will help to alleviate the shortage of qualified technicians.

Finally, there is one other area of concern that neither of these two bills addresses. It is getting progressively more and more difficult to find qualified personnel to teach the kind of classes we are talking about. It is not easy to convince a prospective teacher to give up salaries in the $25,000 to $40,000 range to teach in a public school system where the salaries range from $13,000 to $25,000. Some of my ex-students that are now graduating from college are getting offers for more money than I am making, and had I chosen to stay with industry, my yearly pay would now be more than $10,000 over what I am making now, and in a few years the difference would be far greater. I can only afford to teach because I have a working wife. Something should be done to attract qualified personnel to the teaching profession. Equipment without the proper instructors would not be of much help.

Mr. MILLER. If it makes you feel any better, Bear Bryant couldn't coach at a community college in California either. We do have our problems with credentials.

Mr. Casey.

STATEMENT OF JOHN CASEY, PRINCIPAL, PACIFIC HIGH SCHOOL, SAN LEANDRO, CALIF.

Mr. Casey. Thank you, Congressman Miller. I am also going to destroy most of what I put down here because my illustrious colleagues said it before me.

I will try to summarize and make a few comments on some other items I heard this morning.

I am here this morning as a layman, principal of Pacific High School. I know a little bit about computers. I see the computer program we have in our school. I am overwhelmed by what I see the students and kids doing.

I brought two other gentlemen with me this morning who will be available for questions, Mr. Robert Qualm, the assistant superintendent of instruction and Mr. Russell Gustafson, my department head in math, and a computer science teacher.

Mr. Gustafson is the man I go to see when I have a question about computers.

A few comments.

Recently I was able to attend the National Association of Secondary School Principals Conference held here in Frisco. One of the situations attended was led by a Dr. Gary G. Bitter, professor of mathematics and computer sciences at Arizona State University at Tempe.

In part of his presentation he noted the anticipated increase of computer use in several areas during the next 5 years. These areas and the percent of increase are as follows:

In the home area, 296-percent increase; in schools, 314-percent increase; school businesses, 358-percent increase; offices, 1,511-percent increase; and in the scientific arena 364-percent increase; this within the next 5 years.

Maybe these figures appear to be excessive, but I agree with Dr. Bitter they are realistic and may be possibly conservative.

Public education is and will have pressure put on it to have computers in the school programs. We cannot afford to purchase them now or, frankly, in the future. We need assistance through appropriate legislation and the cooperation from business and industry in order to provide computers, adequate software and training for staff.

In order to prepare for computers, educators must be cautioned to plan slowly but surely. Districts need to establish long-range plans, selection criteria, and to provide by ourselves the help such as the county officers or other firms, staff development for all staff in the schools. We cannot go out and hire people.

I am confident the public education can meet these needs and demands, but we need help from others.

Finally, let me make three comments: I could make 300, but I won't take the time this afternoon on this.

I cannot disagree with the emphasis devoted to increased math and science in secondary schools; however, we must remember public elementary and secondary education must attempt to deal and cope with all levels of individual literacy, and all disciplines, not just computers.

We must strive to educate all.

I am not convinced the computers—I am convinced, rather, that computers can be a major bridge to improving total education, not just the kids with the high math/science fields; we don't have all of those. We have everyone.

Second, I hope we will not worship at the shrine of test scores. It was noted some test scores showed a climb. It appears too often this is the sole judge of education. We must note many of these standardized tests have been changed over the years to eliminate the easier questions and more and probably less qualified students are taking nonmandated tests such as the SAT.

These two factors alone will result in lower test scores automatically.

Third, I hope business, industry, and education can develop closer working relationships as I am convinced education does not thoroughly know what business and industry want and, conversely, business and industry is not aware totally of what education is attempting to do.

My final comment, I am definitely convinced that at Pacific High School computers will not be in closets.

Thank you.

[The prepared statement of John Casey follows:]

PREPARED STATEMENT OF JOHN D. CASEY, PRINCIPAL, PACIFIC HIGH SCHOOL, SAN FRANCISCO, CALIF.

It is a pleasure and an honor to be asked to appear before this committee today to give my input regarding the necessity of providing computers for elementary and secondary school students. It is my belief that we are in the computer age and it is not an age of the future. I address you today as a layman regarding computers, computer literacy and computer technology. However, I firmly believe all educators must be cognizant of the era we are in.

Recently, I was able to attend the National Association of Secondary School Principals Convention held in San Francisco. One of the sessions I attended was led by Dr. Gary G. Bitter, Professor of Mathematics and Computer Education at Arizona State University, Tempe. In part of his presentation, Dr. Bitter noted the anticipated increase of computer use in several areas during the next five years:

Percent of increase in 5 years

Areas:	
Homes	296
Schools	314
Small business	358
Offices	1,511
Scientific	364

These figures appear to be excessive, but I agree with Dr. Bitter that they are realistic, if not possibly conservative.

We are in a computer revolution era. We do not have adequate personnel trained to develop programs, repair computers and work with numerous segments of our society to assist business and industry to utilize computers to their ultimate potential. It is the responsibility of the schools to attempt to fill this void by preparing students by the end of their secondary education to be competent in many of these areas.

Whether we realize it or not, computers are a way of our present life. In large stores we note multi-digit numbers punched into the cash register before the actual price. This, in fact, records, by computer, stock availability. Grocery stores have developed systems to "read" prices and stock. Modern automobile centers utilize computer systems to diagnose mechanical problems. Transportation systems are run by computers. Computers are used by the Internal Revenue Service, Division of Motor Vehicles, Veterans Administration, Insurance Companies, the stock market, banks, the federal and state government.

Public education will and is having pressure put on it to put computers into school programs, and we cannot afford the purchase of adequate numbers of computers, now or in the future. We need assistance through appropriate legislation, and cooperation from business and industry in order to provide computers, adequate software and training for staff.

In order to prepare for the computer, educators must be cautioned to plan slowly but surely. Districts need to establish long range plans, selection criteria, and provide staff development for all staff. I am confident that public education can meet the computer demands being placed on us, but we must rely on outside help.

In advance, may I thank you for your support.

STATEMENT OF DAVID EAKIN, SCIENCE TEACHER, JOHN SWETT HIGH SCHOOL, CROCKETT, CALIF.

Mr. **Eakin**. I won't repeat my written statement. I do want to add one thing.

Neither bill addresses what I consider to be the most serious problem, and that is the teachers.

We have a fairly well equipped electronics shop.

Two years ago we lost our electronics instructor who went on to bigger and better things. We advertised for an electronics instructor. We got not one applicant anywhere. So our electronics shop is locked up, all the equipment sitting there, not in use.

The problem I think is getting an instructor. As a personal example, I have a Ph. D. in atomic physics from U.C. Berkeley and I can program in three computer languages. I teach computer programing, but my students who graduate from high school go out and get jobs that pay more than mine does, right out of high school.

I think that is a major problem that some bill should address soon.

[The prepared statement of David Eakin follows:]

Prepared Statement of David Eakin, Science Department Chairman, John Swett High School, Crockett, Calif.

In Support of: H.R. 5573 (Technology Education Act of 1982) and, H.R. 5820 (Electronic and Computer Technician Vocational Education Incentive Grants Act).

I have been teaching computer science classes at my high school in Crockett for 12 years, but until this year I have had to teach these classes without a computer. In my entire school district there has not been a single computer until this year. Now we finally have some microcomputer equipment, obtained with outside funds and private donations, but this new equipment was not purchased with school district funds. For lack of money, my public school district has not been able to buy new scientific or electronic equipment of any kind for many years and the school has fallen badly out of date in the kind of technical training it can offer for students. These two bills should be very helpful in stimulating the computer and electronics industry to come to the rescue of the schools.

There is a great need for people with training in computer electronics. Many of the students in my high school computer classes have found good jobs awaiting them as soon as they leave school. The best way for the computer industry to get the technically trained personnel it needs is to support the schools, both financially and in providing modern equipment for the training of students. I most heartily support these two bills that address this problem.

Mr. **Miller**. Dr. Miller?

STATEMENT OF NEIL MILLER, SPECIAL EDUCATION TEACHER, VACAVILLE, CALIF.

Dr. NEIL MILLER. I am Dr. Miller. I am not a special education instructor. I am the founder of WEAN, World Education Athletic Network.

We are a service organization serving needs all over the world. I came here really to offer—at the behest of Mr. Stark—firsthand user level inputs.

We have heard a lot of statistics today and a lot of opinions on what the dollar value and how many students and what percentages learn engineering and don't learn it and all the other factors that go into it. We are dealing with people. People cannot be put in a binary whole.

They have real needs. Those needs have to be addressed in an educational system that will respond to the needs of the individual and the social structure they will be living in.

I feel most of the things that have been brought up before the committee this morning—and I am diverting from my prepared text as well—were very important. Such things as were just brought up. We are dealing with more than scientists.

One gentleman was qualifying his scopes. We are dealing with people that maybe all we have to do in the computer education area, the CAI, is teach people how to live with the computer.

What do they do with it? It will be in every home, every car. I have documents showing that new cars will talk to you. Put a key in the switch, it tells you if you are out of gas or what.

How to deal with those things. They sound simple, but they are not easily understood. They are frightening. It is like people who don't want to respond to you on a telephone answering machine. That is an area that has to be discussed and covered effectively.

In dealing with disabled, handicapped people, we are talking about giving an Apple computer—I agree with the concept, but not with the utilization, the implementation of the concept. Disabled people, how do they manipulate a computer? You have a thousand different perpheries that can be made available for different needs.

Are they going to be eliminated from your bill? Small organizations like myself who perform and design and manufacture these kinds of peripheral equipments, we are not listed as major contractors. We are not major producers. We have just completed and hope this year to have a system put together for a girl in Shingle Springs suffering from cerebral palsy who has no conversational capability at all. Our speech program will do 100 percent of her speaking for her in a classroom and conversational situation.

We are not allowed any tax benefits for contributing that service to her. There are tens of thousands, if not millions of people in the world—not to mention 8 million in the United States—who have need of these special services.

How is your bill going to respond to that particular need, both in software and hardware applications?

I had a meeting just this past Wednesday with Congressman Fazio and some other educators from the area, superintendents of schools. I couldn't believe the response that I received. It wasn't that it gave me the impression they were afraid the computer was intruding on their sanctum sanctorum, but they found there was no real use, no application for this kind of system in the school districts.

I think again we get back to that initial problem.

Do we have to start by teaching the kids, who already know more than I know, of how to use it, or do we start at the top level and work down?

Say all right, Mr. Instructor, Mr. Superintendent of Schools, Mr. and Mrs. Teacher, this is what it is all about. Are you going to have some way in your bill to make sure that they don't end up in the closets? Because what good is it putting a terminal into a school if a teacher says I don't know how to use it and it sits there?

Are we going to come up with some system in your bill that says all right, maybe at the end of 18 months? What kind of grade levels have we changed? Have we had any effect?

California has admitted constantly, and it has been admitted across the country, we have reduced the entrance levels for colleges and universities. I don't know if that is the real reason or not, but it has generated a cycle in our country.

Poor level requirements or entrants generates a poor level of graduate generates a poor level of teacher. It keeps going again and again, a vicious cycle.

Is there some way? I have not seen anything in the bill that would attack that problem so at least if we are going to invest money, taxpayers' money, that we are going to have some way of guaranteeing that at least we see something for it?

[The prepared statement of Dr. Neil Miller follows:]

PREPARED STATEMENT OF NEIL MILLER, SPECIAL EDUCATION TEACHER, VACAVILLE, CALIF.

Mr. Chairman, honored members of the Subcommittee on Elementary, Secondary, and Vocational Education. Please forgive the loose character of this statement, as time was not available for an in depth position paper.

However I am grateful for this opportunity to add my views to those of my knowledgeable peers, concerning the "The future of the Computer in our Educational system." Members of this committee, I must first make it clear that I do not consider myself an expert, and do not claim to have all of the answers to the complex question before us today. Nor do I know of any one person who could lay claim to such an august position. With the complexities of the education field and its inherent diversification, the newness of the Computer Assisted Instruction concept (C.A.I.), plus the dramatic changes in the state of the art that occur every hour. It seems to me, that it will be many years before any one person may have sufficient knowledge to speak with such an authoritative voice.

My interest in the computer as a compatable partner for humankind goes back to the days of UNIVAC and the science fiction writers of the times. In those days, the public's view of computers was as an arch rival from a distant universe, destined to destroy mankind for its own devious reasons, or some benevolent scientist in some remote area seeking a means to end mankind's physical burdens and create a quasi Utopia. I am sorry to say that even today some of these fears and fantasies still linger on. If man fears the computer, it is because he is afraid of what he does not understand, and is not ready to accept the responsibility of his own creation. If mankind fears the computer taking over his lifestyle and leaving humankind to wither upon the vine, he does not understand his own heritage.

Humankind by its own innate nature is an animal of exploration, of challenge, and will inexorably be drawn to test their physical selves. I do not forsee the Science Fiction vision of a huge brain without physical form floating in a glass bowl, issuing orders to a society of humanoids to satisfy its physical needs.

I hope I have laid to rest any lingering fears of the intrusion of the computer into the hallowed halls of academia, so we may concern ourselves with improving our lives, and securing the future for our children.

The value of the computer as an educational tool became apparent at the introduction, and mass availability of the minicomputers and the great supply of periphal units and software. However the total reality of the C.A.I. concept took hold after my mother suffered a serious cerebral stroke, which left her with a devastating loss of her ability to communicate with the outside world.

Although my mother received quick and efficient help from a professional speech therapist, her involvement was deep and she was not able to regain an acceptable degree of speech.

Note: I would like to stress very strongly at this point, the lack of progress in this situation was not due to the inefficiency of the therapy my mother received, but was in fact due to two external factors which were beyond the control of the participants. Point one, the Therapist was limited in time and frequency of her visits due to the very heavy case loads that are placed upon these dedicated people by an ever increasing demand for their services.

The second factor, and a very important one, is the understandable lack of enthusiasm on my mother's part. For a woman who was very active and involved in living, the sudden emotional shock of being incapable of caring for one self, of being locked inside a body which will not obey your commands, to realize you're incapable of making your slightest needs understood by your friends, family and neighbors, can only bring frustration and a deep rooted feeling of total uselessness.

This natural lack of motivation on the part of the victim after having suffered such a devastating loss is very understandable.

With the disappointing results on my mother's therapy and the lack of interest on her part, I searched for a way to resolve these two basic problems in the most efficient manner I could, and at the lowest possible cost.

The state of the arts in Voice synthesization had reached a reasonable plateau, and I felt it was worth considering. Later I moved on to LPC (Linear Predictive Coding), which had reached a sophisticated level of development. This reinforced my belief that a teaching system could become a reality today and would be extremely effective, and which was desperately needed.

Introducing SpEACs (Speech Enrichment Assistance Computer System). SpEACs is the worlds first low cost portable, interactive computer system designed as a full teaching partner in the classroom or at home. The key words here are conversational and full. Using the latest in speech encoding, text to speech, speech to text, voice recognition and video tape and or disc, in a totally interactive system which is finally married to a highly defined terminal to control the entire system.

This system is capable of carrying on limited conversations with the students by responding to their verbal input. SpEACs can be trained to speak in any language known to man and in any area of study. This skill in communicating with a student would result in what I call a HUMAI syndrome (pronounced you may, Human/Machine Articulation Interaction). This technique I feel can be used in all learning situations, not excluding the deaf and the blind. In the interest of time, I have taken the liberty of attaching a rough draft of the above system which was submitted to the Johns Hopkins University, as a participant in last years 1st national search for new uses of computers for the handicapped, which brought us into competition as regional finalist for California.

This HUMAI concept would foster a basic repour between student and machine, this interaction between student and machine would lead to an improved level of interest in performing the assigned tasks, and result in a higher level of accomplishment. This interaction between these two elements of communication and identification force me to discard the common reference point of C.A.I. in preference to a complete computer teaching system, which I refer to as I.C.E. (pronounced ICKY), I.C.E. stands for Interactive Computer Educator.

As previously noted, it is my feeling that this interaction between student and computer will foster an increase in the students desire to accomplish the assigned tasks and thereby improve their standing in the classroom.

The questions we must now answer, are how does SpEACs fit into the current educational format? Is there a need for such a system in the classroom? In answer to the first part of the question, we must first establish where the system would be the most effective, and at what grade level.

Is the system effective with both the handicapped learner and non handicapped learner? I have found that the disabled and non disabled learners are alike in their ability to learn more easily from teaching aides that effectively focus their attention on its content, although the quantity of materials absorbed may vary with each student. I consider the Attention Management phase of this concept the critical ingredient in the program.

The computer has a fascination for the young and old alike, sit a person in front of a unit and watch the instant attention it commands. SpEACs has enhanced this fascination with those tactile mechanism of daily life, i.e. eye/ear, eye/hand, hand/ear. These factors are necessary for a thorough I.C.E. program.

Success is the greatest incentive to even greater success. We all recognize the principle that as humans succeed in one effort, they are driven to strive for success in another and will try to avoid any failures. Eventually they begin to develop, a success syndrome, and what other purpose does education have but to instill a desire to succeed.

Note: We always seem to direct our efforts towards the classroom and the needs of the attending students. What about the homebound students? What rights do they have to attend classes and learn a skill or just maintain their academic position with their peers? The I.C.E. system is magnificantly suited to solve this very special requirement. With a phone modern hook-up a teacher can work with her classroom and the homebound student at the same time, without causing any undue difficulties to any of the students, each student progressing at their own pace. Aside from the obvious benefits to the students, the teacher, and the school system.

The cost effectiveness of the entire I.C.E. concept can only bring relief to the badgered taxpayer. This is not a pipe dream of the coming 31st century, but is as real today as the sun's rising each morning. We have all seen the greater role television has played in our every day lives, and the new uses that it has been applied to in education, home support, shopping, etc. The next logical step is the intergration of the computer terminal with television, which will expand the compatable range of this man/machine interaction. The concept has even entered the work market place with such programs as HOME, which is a work at home computer system, that allows the home bound employee to continue to earn a living and maintain his or her integrity as a useful contributory citizen. These programs are only the proverbial tip of the iceberg, and there are many miracles yet before us, if, and that is a big IF, we have the foresight and guts to face up to our own future.

The 2nd part of the question was, "Is there a need?" Mr. Jobs, co-founder of the Apple computers organization, put the answer to this question in very basic terms "We are undersupplying engineers by a factor of three to one. U.S. kids have to take less math than Japanese or Russian kids". The statistics bear out his observations, however I feel he is slightly short sighted.

It is not just the math and sciences that the students do not have to take, but the level of instruction which is available. It is common knowledge that our secondary and upper division schools have consistently lowered their entrance and achievement levels to placate the poor basic education which our youth are receiving. This has generated a vicious cycle of "lowered teacher levels equals lowered graduate levels equals lowered teacher levels, and so the vicious cycle goes on.

It is not enough to say that the Japanese or Russians have to take more math or sciences, but to question, is there a relationship between the quality of these subjects in the three countries? Concepts such as SpEACs could very well be the difference between our regaining the lead as a world cultural and technical leader, rather then an also ran.

It seems that each time I make an observation, I am forced to qualify my position and this moment is not different. I do not wish to impune the teaching profession as such, but to place the current facts in line with the question before us today. I suggest finding a solution to this problem is not to be considered lightly, and is of national concern.

The Japanese have set their goal on being the world leaders in Artificial Intellegence and have set aside one billion dollars plus a year, to meet this target. Since Japan and the United States are currently the only two countries capable of producing the quality chips required for this level of computer, it is quite clear that we are already in a race for our very survival as a viable participant in the world of the next morning.

In all fairness I must also admit that not all of my peers feel as strongly to the true future of the computer as humankinds partner and that I.C.E. is the answer.

Mr. K. M. Joels of the Smithsonian Institute, speaking at a seminar at the recent COMCON. 82' held in San Francisco stated "I do not think everyone needs a computer, the average person does not relate well to math, science or computers. Everyone who wants a computer should be given one free! Get rid of the keyboard; people don't like keyboards; people don't like typewriters; give them a touch screen on their television sets." Mr. Joels does not concur with the philosophy that because people are now playing computer games, they will soon be computing. He further feels that the impact of the personal computer in the classroom will be limited.

I must take issue with Mr. Joels views, that the impact of the computer in the classroom will be limited. If this is true, it is not due to the computers inability to perform its assigned tasks, but I feel is directly attributable to the lack of understanding of its purpose and its capabilities by the school staff and administration. The computer should not be a threat to anyone who understands its purpose. What is the computer's purpose in education?

You have heard many replies to this question. A cheap teaching system, a never tiring teacher, a teacher that never complains or will strike, a teacher that is never intimidated, a teacher that never needs oiling, a never, never, never. Members of this committee. You have just received your first lesson in computerese, "GIGO" Garbage in Garbage out.

There are just two reasons for the quick adoption of an I.C.E. program in our national educational system, and those factors were eluded to earlier in my statement. (1) Quality (2) Quantity. These two quantities I feel are the most important considerations we have to make in deciding how our education process will survive in the future. A recent study in California Commissioned by the California State Dept of Economics, and Business Development, quite clearly pointed out that with the advent of the computer industry, a vast and exciting era of new jobs and challenges are ahead of us.

If we do not start now to prepare our students to handle this new technological era, we will have committed the future to a dark world of mediocrecities. I realize that this sounds like a doomsday prediction and may be better left for the parkside orator. However when you consider that every phase of our lives at work, or home and at play will in great measure will be directly effected by the computer, the question must be addressed here and now.

Members of the committee, where we go from here is in great part up to you. However I leave you with the following thoughts. Was Mr. Joels trying to warn us of overkill in this giant computer giveaway? Does every school need the same equipment? Do all terminals work well with each other? Are the needs of the Special population met by all terminals? If we are to consider the skills of our students as a national treasure, we must insure all students the same measure of accessability to any system with which they can interface. If your bill is to be equitable, it must establish a basic formula to allow a fair balance of different systems from large and small producers.

In closing I would make this observation. In the same article from the Wall Street Journal, Mr. Jobs is quoted "It is really something for nothing", he goes on to say "And I think the private sector will respond gallantly". Question; Is $20 million nothing? Who gets something and who gets nothing?

Mr. Jobs is again quoted as saying "One competitor swears he isn't going to let a generation grow up looking at our (Apples) logo". This sounds more like a wargame and the battlefields are the schools.

Members of the committee, I submit, Is the Apple company truly interested in the future of our children and this country, and ending his stated inequality of engineering graduates, or just another marketing ploy? I do not wish to question the motives of a fellow entrepreneur, but I feel obligated to ask the same questions that must be on a great majority of the publics mind. If the computer groups are interested in the future of the U.S., why do they need a special tax incentive bill which will give them not just a tax advantage, but a real monopoly on the future purchasing minds of our children, as confirmed by Mr. Gregory Smith, Apple Educational Marketing Director.

Members of this august committee, I cannot suggest too strongly, that although the concern and interest you have shown in bringing this matter to the high chambers of congress, you must consider this. What may appear on the surface a deal you cannot refuse. Think carefully, what you decide here may have far reaching effects on the future of this country, its economy, its prodigy and the very fabric of our futures. Thank you again, for this memorable opportunity to address this esteemed body.

Attachments: SpEACs project proposal; Case study (excerpts, Dawn X).

SPEECH ENRICHMENT ASSISTANCE COMPUTER SYSTEM

My name is Speech Enrichment Assistance Computer System. My friends call me Sp.K35SS, or SpEACS.

WHO AM I

I am the worlds first computerized conversational teaching system. I am a highly trained, low cost, conveniently available. My terminal is of unquestionable reputation.

I am capable of speaking my thoughts and hearing any external response. In addition to these unique skills, I still retain all the basic abilities of a humble computer.

It is true, there are many talking computers around, but I am the only conversational system ready to serve the community now and at a very reasonable cost. I have been able to learn these new skills by application of the very latest in the state of the arts in voice synthesization and identification mated to an advanced hardware concept.

For the purposes of clarity, I will address my statements to the field of language and the variety of areas I can instruct my students. I am capable of teaching breath control, the basic building block of speech. Vocabulary development, fluency, encoding, articulation and word attack skills. Simple sentences and spelling.

I will teach these skills to those who have lost their own abilities or those who never had a communications skill, but are trainable. In short anyone with a language problem.

HOW I DO IT

I am sure you already know that until recently voice synthesization was considered a toy to be played with or experimented with. In the early days a computer would rely upon a stored memory or vocabulary to speak upon command. I have been trained by learning the basic rules of speech and a lesson plan by which I can evaluate a given response and reply properly.

With a combination of electronic wizardry and a creative teacher I have an unlimited vocabulary, not to mention a greater variety of languages and subjects which I can be of assistance.

Note: One point should be made very clear at this time. I am not a replacement for the teacher or therapist, but just a sophisticated tool.

LANGUAGES

I have been trained in American English, and have received a multi-language skill in Spanish, French, German and can handle many others. My instructors have taught me a very important fact. That one must always be open to learn new skills and I feel my limits are those imposed by my tutors and myself.

Let us consider a sample situation. A student has suffered a Cerebral stroke and has lost a substantial part of his or her communications skills. What do we do?

First we establish the problem area—Articulation.

Next a lesson plan is designed by the teacher, i.e.

Involvement: Pupil is instructed to repeat my word commands.

Speech by Demonstration: I pronounce a word or a sound, etc.

Direct Correction: If the student does not respond within the proper parameters, I make the student repeat the last exercise again. If a correct reply is made, I go on the next lesson.

A more complete process of my operation in this kind of situation can be found in the flow diagram.

SPECIAL EQUIPMENT

I have a micro-cassette built into my system to record the audio response of the student, which is studied by the teacher, to evaluate his or her progress and to make any corrections in the lesson plan. If there were any changes I would be given a new plan to follow and the process would go on.

In order to meet the needs of a student to have a familiar face around, I have a micro video cassette playback unit interphased with my program which would come into operation at the command of my program and would play through the students personal television set.

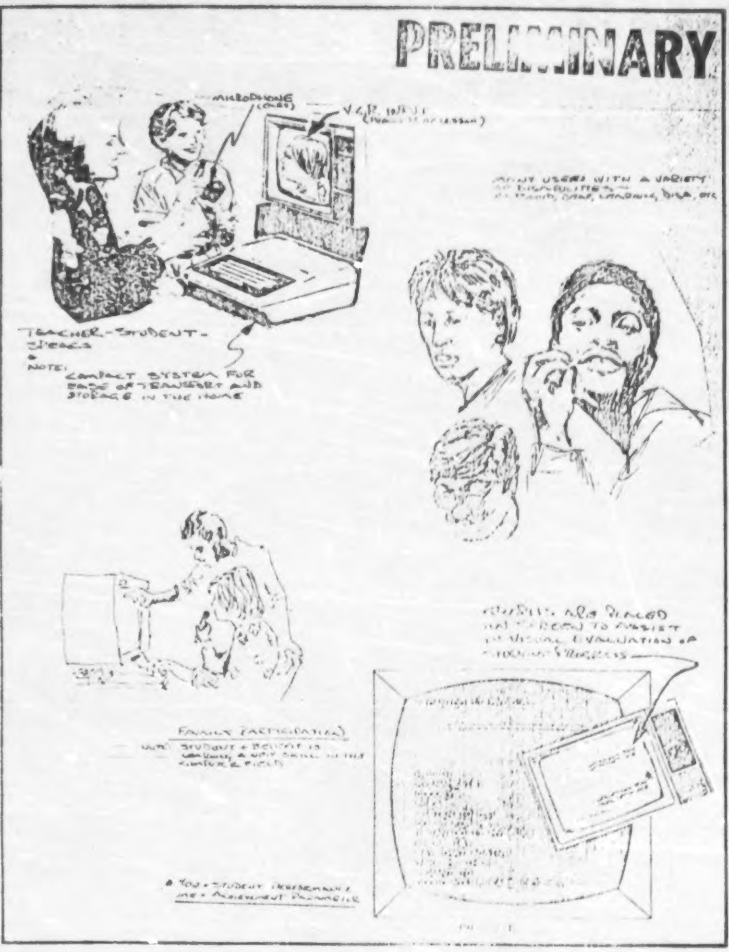
I also have many specialized control units available to allow a student with limits on physical dexterity to actively control the system. I can even be operated by the simple utterance of a sound or breath of air.

I am easy, just a short ten minute instruction session by the therapist or teacher is all that is needed to give the student complete control over my skills. I come to their homes complete and ready to go, just plug me in, push my switch and off we go into an exciting new world of education.

Remember, the secret to good education is the repour between the teacher and student, and I feel confident that as a responding entity, I can establish this sense of identity with the student.

HARDWARE

Keyboard; Z-80 Microprocessor (16 K RAM); Speech Synthesizing System; Speaker; Voice Identifier; Micro Audio Cassette Recorder; Micro Video Cassette Playback; and Standard T.V. Monitor Connector.


PRELIMINARY
MICROPHONE (CORD)
V.C.R. INPUT
MANY USERS WITH A VARIETY OF DISABILITIES— ... DEAF, LANGUAGE, DISA, ETC
TEACHER-STUDENT-SPEECH
NOTE: COMPACT SYSTEM FOR EASE OF TRANSPORT AND STORAGE IN THE HOME
FAMILY PARTICIPATION
NOTE: STUDENT + PARENT IS WORKING ...
STUDENT ALSO PLACED ... SCREEN TO ASSIST IN VISUAL EVALUATION OF STUDENT PROGRESS
• YOU = STUDENT PERFORMANCE
ME = ASSIGNMENT PARAMETER

SP.E.A.C.S.—NEEDS ASSESSMENT

In order to establish a need for the SpEACS program, it would be helpful if we could quote vast numbers of reports and studies on the interactive uses of the computer in the education fields. However this supply of documentation does not currently exist, although its on the increase at the moment and is being circulated among a limited group of users.

For the purposes of establishing a need for SpEACS, I have elected to illustrate one true life case, in which the total aspects of the program can best be demonstrated. WECAN was contacted by Mr. Robinson, concerning Dawn, and was asked to design a SpEACS unit which was portable and could be used on her wheelchair. We have started this project. F.I.N. #A821-1W (X, Dawn), REF. by M. Robinson, A.T.T. Sacramento. Documentation: Assistive Device Center, School of Engineering California State University, Sacramento. Report date: December 4, 1981.

EXCERPTS

Needs

She needs a system which will allow her to express her daily needs and make choices herself. Communication capability would increase her peer interaction, thus allowing Dawn to increase her social and communicative skills. She would also like to continue school and systems which would facilitate improvement in spelling and other academic skills are needed.

ASSESSMENT

Word vocabulary.—Dawn was assessed to determine the viability of word selection as a mode of communication. She chose 100 percent of the words in sentences in the first grade level and 30 percent using third grade level.

Spelling.—Purpose of this test was to determine if spelling was an exceptable mode of communication. Correctly spelled 12 of 12 words at second grade level and 2 of 12 of fourth grade level words presented.

Receptive vocabulary.—Dawns ability to understand spoken words was assessed to help determine the type of words which could be included in a communications system. Test used was a shortened version of the Test for *Auditory Comprehension of Language*. She correctly identified all adjectives, verbs, adverbs, pronouns, prepositions, -er, -est morphemes, plurals, passives, interogatives, negatives, direct-indirect object relations, and adjectivals. Some difficulty with some third person markers and clausal relations.

Physical/Sensory.—Determine which motor systems Dawn can use to most accurately and easily make selections from a system. Dawn displays better control of right hand and arm then left. Head movement vertically and horizontally within normal range. Vision, peripheral approximately 75 degrees left and right. Tracking a travelling object approximately 60 degrees left and right.

EVALUATION

All general communication needs have to be met by one unit or system. She needs to be able to select from this system any operation independently, and also have access to all complimentary systems, i.e. A 64K TRS at home.

In school, Dawn must address several tasks which are dependent upon communication. First she needs to be able to ask and answer questions of instructor and peers, as well as participate in group discussions.

This may or may not be accomplished by means of a small printer unit, however it would be wise to point out that this is a very slow process. To alleviate this problem, we would prefer a speech unit in addition to a portable printer.

Dawn also needs to complete written assignments both in and out of class and independently. This will require several things from the system, first it must be portable, to allow Dawn to attend classes with her peers, secondly it must have a fast rate of input/output in order to generate the volume of work required to maintain her class room assignments.

The system should also have the capability of generating her work in standard page format, in addition she would need the ability to correct errors she may make in selection of answers or questions.

The computer system should also have the capacity to store, and monitor her responses.

It should also have the ability to speak whole phrases, words and select spelling played out in intelligible sound.

It also appears that Dawn may have a faster pointing response, indicating it may be wise to include a pointing system, i.e. stick, light pencil, etc, where quick response may be preferred over a keying unit.

This evaluation seems to cover a great amount of material, which is indicative of the complex problems SpEACS must cover. On the following pages we will attempt to show how this concept can and has met all of Dawns needs.

Dawn X, is not a unique case, in that her problems are in some ways slight to one and grave to another, however we hope she is representative of the total potential problem areas that the SpEACS program must and is ready to serve.

I will try to illustrate how we have used the full potential of the system, and did not have to modify any major components of the concept.

Portability is already a major consideration, and all we did was exchange a table system for a new pocket microcomputer, which by the way is not out yet, but will be by the time we are ready to build Dawns system.

Memory capacity is of prime concern, as the system must perform many functions to compensate for Dawns inability to do the same. Our unit has a 16K, expandable memory, built in real time, full string handling, plus full addressable 7 x 156 dot matrix LCD graphics.

Language used in the component is Extended Basic.

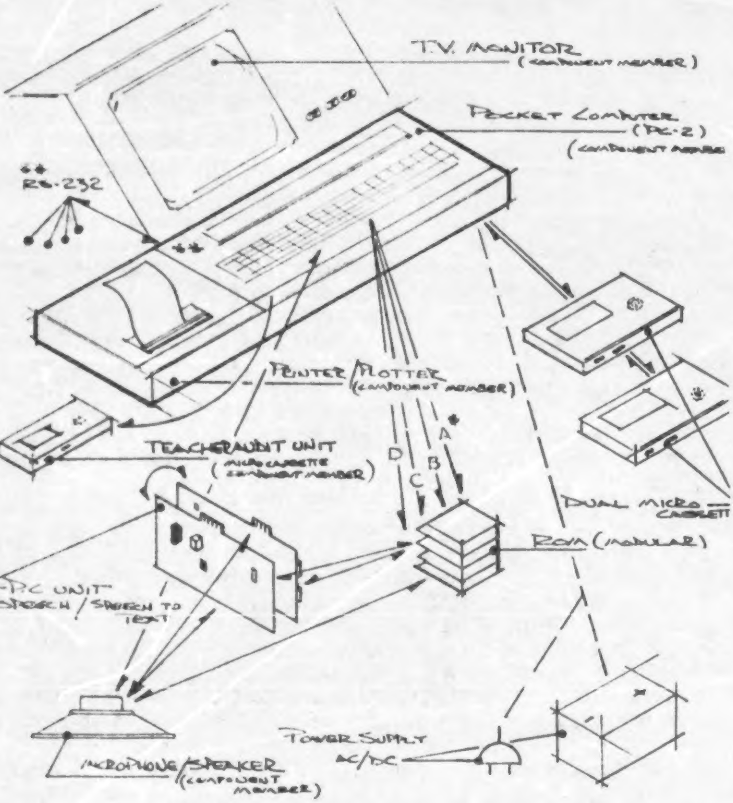
This unit can communicate with other systems through a cable and or modem hook up, in addition to a dual cassette system which would allow a full data communication and logging system. A RS 232 interface unit will be available soon.

The communication needs of Dawn can be met with the SpEACS system by stacking the ROM/RAM on the outside of the unit. This external system was designed exclusively for Dawn. We took the cartridge concept and by ribbon connection, we were able to stack a group of cartridges, each with its own function, outside of the main component.

This technique allows for the CPU to function as a traffic cop only and not cut into its memory count so as not to inhibit its full functionality. With a special key pad Dawn can select from a group of preselected programs or work more than one program at a time. More details in the rear of this proposal.

The print requirement of Dawns will be met by a add-on unit which approximately half the size of the main component, but has full graphics. The printer/plotter can work in four colors, can plot full X/Y/Z axis graphics, text can print in nine different character sizes. The printer/plotter plugs into the computer to form one single, compact, portable unit.

Sample diagram of basic component system is supplied.


T.V. MONITOR
(COMPONENT MEMBER)
POCKET COMPUTER
(PC-2)
(COMPONENT MEMBER
**
RS-232
**
PRINTER/PLOTTER
(COMPONENT MEMBER)
TEACHERAUDIT UNIT
(MICROCASSETTE
COMPONENT MEMBER)
A
*
B
C
D
DUAL MICRO-
CASSETT
ROM (MODULAR)
P.C UNIT
(SPEECH / SPEECH TO
TEXT
POWER SUPPLY
AC/DC
MICROPHONE/SPEAKER
(COMPONENT
MEMBER)

* INDICATES INDIVIDUAL MEMORY CARTRIDGES, IE A=ENGLISH, B=HISTORY, C=CONVERSATION, ETC.

◄ INDICATES DATA FLOW DIRECTION

ROUGH I/O COMPONENT INTERACTION

Mr. **Miller**. Let me stop you there. I think you address some problems that I am not sure as a legisaltor we are able to address. That is my concern.

When I asked the question of the previous panel of where we insert this effort which is basically money, with some idea that we can leverage that to get people to take actions other than they ordinarily would with respect to this field, but I am also very much aware that I am dealing with probably one of the most conservative institutions in the country, and that is the educational institution.

The kinds of problems you lay out I can't legislate them away. They are attitudinal. If you are telling me that a meeting of instructors in Solano and Yolo Counties can't figure out the relevancy of this as they sit next to the University of California and Mare Island and Travis and elsewhere, they can't figure out the relevancy of this education to their students, I have problems I never heard of. I can put all of the computers you want in that school. That may be an over-simplification, but what scares the hell out of me, when I try to convince my colleagues to commit $50 million, which was pointed out is a million bucks a state, you sneeze and lose that much in the Armed Services Appropriations Committee. Or you get that much, depending upon who sneezed.

If you are going to put it into a system that is not able to assimilate it and use it for the purposes that everybody in this room talked about this morning, you are kind of hard pressed to do that.

I can't legislate away or into existence those attitudinal outlets.

Dr. **Neil Miller**. First of all, let's clarify. In my experience it is not a general thing. There are pockets of resistance. I was surprised to find some of them so close to home.

Mr. **Miller**. There are fewer pockets of success.

Dr. **Neil Miller**. That is true. I think that is based not necessarily because they are resistant to success, it is because the proper medium to achieve that success has not been presented.

We are talking in terms here of software. Every school district has its own way of teaching a specific. There are general areas they would follow, but in our area they may do it different; they may do it differently in yours; they may do it different in Arizona.

Generating the software for that program, we are going to have a constant accepted across the board? I have people that cannot speak but can read and write. I have them that can't read and write, but can speak. They can't move their hands. They have a slower learning curve than the average student.

Do we tailor make out of this bill, when we start getting these pieces of equipment, what company will take the expense to tailor make a particular program to fit that particular need or do we wipe them off to the side burner again? Those are areas.

An educator comes to me and says he only thinks it has limited use in the school system. His own words. I can see a computer being put into our school district as a tool for the handicapped. The rest of the kids don't have a need for it. That is a superintendent of schools.

Mr. **Miller**. You are creating a constituency for the computer if he keeps that up.

Dr. **Neil Miller**. These are some areas I feel strongly about.

We are talking about computer assisted instruction. I think what we really are looking at is the future coming to where we have an interactive computer system that becomes a part of the teacher and the teaching concept. That is far more far reaching.

Mr. GUSTAFSON. I am Russell Gustafson from Pacific High School.

You are right about the software. You have to have the software.

Specifically, you could have your software written for you by your advanced students. Believe it or not, in every school district you have a corps of bright mathematically-oriented computer-type students. You would be surprised.

I would say at least 10 percent, maybe 20, 30 percent. These students are capable of writing the software for what you want, custom writing it for you, exactly. We have done it at our schools.

Mr. MILLER. Anybody else?

Mr. CASEY. I think I would like to speak to that.

We have to look creatively at what we need for each school. Each school is a separate entity. What these gentlemen deal with and what I deal with are totally different. I am looking for the best programs for the student body of Pacific High School. I may not be able to find them out in the market. I may have to develop them myself or depend on my teachers to develop them. I think this is a valuable education for them also.

Dr. NEIL MILLER. There is, I think, one other area that hasn't been covered in this meeting. That is the fact of home tutoring. There are many people at home who cannot get to schools. Even work, they have a program called home, where you can work at home at a terminal. Those are parts of those areas. I don't see anything in the bills or any indication these will be considered for people who have those specific needs there as well.

With that terminal at their house, they become a cooperative, contributory part of the community; an effective part of the community. Without it, they are still landlocked and we still have a very limited bill.

Mr. MILLER. Anything else?

Thank you.

Mr. MORAN. I am Tom Moran of Electronics Magazine. I am wondering if any of the companies who are talking about donating the equipment could possibly use computer simulation or other methods to help analyze the problems we are talking about here?

In other words, build up a data base? Why not use the tools we are talking about?

Mr. MILLER. I think one of the things you would like to believe is that if you expose the nature of the problem and you expose the willingness of the institutions to accept some of the solutions, maybe you, in fact, create a market, because I think part of marketing, I suspect, will be to convince individuals in the educational fields that there is a system that is applicable to their needs and desires.

That is obviously what you are creating here, just as textbook manufacturers convince you that this is a system that will teach people to read, to do mathematics, and I expect that that would have to pass muster almost in the sense of how traditional educational software, if you will, does today.

Whether that is germane or not remains to be seen to this industry.

Well, thank you very much for your time. I would hope as we continue down this path we would continue to have your input. At least it is not my intention that this would be the first and last in this series of hearings, but an ongoing effort because, as many questions have been raised this morning as have answers. I still concur in my earlier statement that in many instances I think we have a real three alarm fire going on here in our educational institutions.

The degree to which we are able to demonstrate our ability to respond to that is going to have a great deal to say about—as one of you pointed out, both with respect to the national economy and the national security of this country. I think it is just that fundamental.

I think this committee will certainly continue to be involved and hopefully to try to stay on the edge of that to the extent that the Government can be a catalyst. I think that is what we are really talking about.

I suspect both the industry and the need are far greater than almost the ability of the government to deal, but there are some areas where perhaps we can be a catalyst in bringing about the changes in the resources necessary.

Thank you for your time and your contribution. We will stand adjourned.

[Whereupon, at 1:05 p.m., the subcommittee was adjourned.]

[Material submitted for record follows:]

Association of Community College Trustees,
Annandale, Va., April 16, 1982.

Hon. Carl D. Perkins,
Chairman, Subcommittee on Elementary, Secondary, and Vocational Education, House of Representatives, Washington, D.C.

Dear Mr. Chairman: We are pleased to see your Subcommittee taking up H.R. 5820 in hearings this week in San Francisco, and we respectfully request that the views contained in this letter be included in the hearing record.

In our judgment, H.R. 5820 provides a timely new dimension to the historic thrust of the Vocational Education Act, a dimension that could significantly increase the Act's impact on national productivity and employment.

Both your Subcommittee and the full Committee which you chair have a long and profound record of promoting training opportunities for our citizens. Such landmark measures as the Vocational Education Act, the Manpower Development and Training Act and the Comprehensive Employment and Training Act reflect the concern for people and for opportunity which distinguish our nation as a civilization.

In H.R. 5820 we see a concept that builds upon those foundations, and helps national policy to more effectively address the competitive challenge our economy faces in new technologies and global markets.

Up to now, national policy has been focused more heavily upon people than upon opportunity. It has and is focused largely upon the supply side of the employment equation, rather than the demand side which is manifest in a variety of skill shortages.

CETA has been characterized by this imbalance. It has placed too much emphasis on training the jobless for entry-level work that often doesn't prove to exist, rather than giving equal or stronger emphasis to moving trainees into skill shortages that plague many of our high-tech industries that are struggling to meet world competition.

"Frictional unemployment," as labor economists term such imbalance has become perhaps the gravest dilemma confronting the American workforce and the economy. H.R. 5820 could become a vital step in helping the country come to grips with it, and increasing the flow of advanced technicians into the industries that need them.

In her testimony to the joint House-Senate subcommittee hearings on legislation to replace CETA, Pattie Powell of Dallas, who chairs ACCT's Committee on Federal Relations, make the point this way: "One lesson we've drawn from CETA is that the greater strides will not come from recycling the disadvantaged and the jobless for entry-level work but in accelerating the flow of the skilled, semi-skilled, and underemployed into the advanced technology where global competition is leading us. Only when those whose abilities and experience warrant training for the new technology are actually flowing into that demand, and perhaps only then, will significant openings in the employment that they have left develop for the less skilled."

With or without reauthorization of the Vocational Education Act this year, H.R. 5820 could undoubtedly add new strength to the act. If the Committee adopts H.R. 5820, however, we strongly urge that its focus be broadened to cover high technology generally. The training assistance should become available to all technologies which bear upon the nation's standing in global competition, and for which skill shortages can be documented by the Secretaries of Labor, Commerce, Education and/or Defense.

We see several advantages in the provision that the employer cover 25 percent of the total cost of the training. Such a requirement ensures that industry would target the training on real and pressing skill shortages, making national policy a more dynamic force in the expansion of employment.

It further ensures that industry generally would have first say in the selection of delivery systems for such training. That choice should not, and would not, be left to the arbitrary discretion of a state bureaucracy.

We hope the Committee will also consider the possibility that the industry's share of the cost could take the form, in whole or in part, of stipends to the trainees. In our judgment the employer should have the option of directing his support into the training itself or into assistance to the trainees, or a mix of both on a case by case base. The employer should be free to do whatever will achieve the greatest persistance possible of his trainees.

The requirements under H.R. 5820 that the States would have to meet to qualify for its assistance represent, in our view, healthy steps toward making vocational education more responsive to the crisis in national productivity. Specifically, we support both the requirement that States allocate a phased-up share of basic grant support to the program, and the requirement that the State would have to provide at least 25 percent of the program costs "from non-Federal public vocational education funds."

Helping vocational education to better serve the technologies into which global competition is leading the country can only enhance vocational education's contribution to the economy and to the lives of the people it enrolls, in our view. The Washington Post aptly expressed this point in its recent editorial, "Who Will Be Able to Work":

"With money as scarce as it is, there is no excuse for continuing separate federal aid to the heavily state-financed vocational education system, which, with a few notable exceptions, has a generally undistinguished record for serving the hard-to-employ. Money planned for vocational education grants could be much better used as leverage to get state education agencies cooperating in special programs for young people who have dropped out of school or are about to."

Mr. Chairman, should your Committee plan further hearings on H.R. 5820 in Washington, the community colleges would appreciate the opportunity to schedule witnesses.

Dr. Dale Parnell, President of the American Association of Community and Junior Colleges, has asked that AACJC be associated with ACCT in the comments this letter provides.

We are grateful to both you and your colleagues on the Committee for your attention to the concepts and issues addressed in H.R. 5820.

Sincerely,

WILLIAM H. MEARDY, *Executive Director.*

LITTON GUIDANCE & CONTROL SYSTEMS,
Salt Lake City, Utah, March 31, 1982.

Hon. CARL PERKINS,
House Office Building,
Washington, D.C.

DEAR CONGRESSMAN PERKINS: Representative George Miller from California recently introduced legislation which would provide some fifty million dollars for vocational education in computers and electronics. This is a bill which we heartily support, and we would ask you to study the bill closely and offer it your utmost support.

The electronics industry is one in which America is most healthy and very competitive; nevertheless, in conjunction with the industry's plans for growth and future development, it is imperative we have the support of our government and academia in producing qualified technicians in a timely fashion. At the present time this represents one of the very few fields students can anticipate almost immediate employment upon graduating with an Associate Degree. In our community of Salt Lake, National Semiconductor anticipates a growth rate from 2,000 to 5,000 in three years. Sperry Univac could possibly expand from 4,000 to as many as 8,000 if sought after contracts are received. Evans-Sutherland hopes to almost double their work force. Rockwell International is experiencing growth pains, and we ourselves would anticipate a growth rate in the neighborhood of 25 percent in the next two or three years.

I am sure you can well appreciate this represents a scenario which is all too rare in today's economy; nevertheless, it is one which should command the attention of those who are in a position to assist us as we look for graduate technicians who have been adequately trained on equipment which is up-dated and appropriate for the needs of the electronic industry.

We are hopeful that you will respond in a positive fashion to this much needed discipline and give it your support.

Sincerely,

PAUL M. TIMOTHY,
Manager, Industrial Relations.